

THE  
R E S U L T  
O F A  
V I E W  
O F T H E

*Great Level of the FENS,*

Taken at the Desire of

His Grace the Duke of BEDFORD, &c. Governor,

A N D

The Gentlemen of the Corporation of the *Fens*,

In J U L Y 1745.

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By CHARLES LABELYE, Engineer.

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*These Fenny surrounded Grounds in former Times have been  
dry and profitable; and so may be hereafter, if due Pro-  
vision be made.* Commissioners of Sewers, A.D. 1596.

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L O N D O N:

Printed by GEORGE WOODFALL, at the *King's-Arms*,  
near *Cragg's-Court*, *Charing-Cross*. M.DCC.XLV.

THE  
REVIEWS  
OF A  
VIEW

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His Grace the Duke of Devonshire  
The Comptroller of the Household of the King  
In V.U.T. 1741

CHARLES JAMES  
The Comptroller of the Household of the King  
A.D. 1741

LONDON:  
Printed by George Woodfall, at the Kings Arms  
in Pall Mall, 1741.



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TO THE  
R E A D E R.

*I*N the Summer of the Year 1743 I had occasion to travel on Horseback, and in Company with some Friends, from Cambridge to Lynn; to make my Travelling instructive, I prevailed with my Friends, that we should go through the great Level of the Fens.

I was glad of an Opportunity of seeing a Country of which I had heard a great deal, as well as of the various Attempts made to relieve them from the Waters.

I had seen in Holland and Flanders, &c. vast Tracts of Lands, not very unlike the Fens, as to their low Situation; and it was a very natural Curiosity, in a Man of my Profession, and Turn of Thought, to see with my own Eyes the State and Condition of the Fens, to enquire into the Causes of their being so often overflowed, and to examine whether the same Methods as are made use of in other Countries, could not be successfully applied in this.

*The Fens were then in a most beautiful Condition, and so dry, that from Cambridge to Denvers Ferry our Horses had but once occasion to wet their Hoofs in wading through Waters.*

*I made several Observations as we rode, and asked Abundance of Questions relating to the Subject of the Fens; but not meeting with a full Satisfaction, at my Return to London, I spent Part of my leisure Time in collecting and reading all such Books and Pamphlets upon the Subject as I could come at.*

*The odd Notions of many of the Projectors of Schemes for draining the Fens would have afforded me excellent Sport, if not Instruction; but the great Value of the Lands at Stake, and the vast Sums of Money already spent in vain, kept me very serious.—I had no other Intention in these Inquiries, than to improve in Knowledge, and no Design of ever offering any Scheme of my own, or indeed of ever being concerned in the Fens, because I found that several Interests, both public and and private, were deeply concerned; and so clashing, and opposite one to another, that I plainly saw it would be next to impossible to propose any thing that would please them all; and I do now declare, that I am still in the same Opinion and Intention.*

*However, it has happened that in June last, His Grace the Duke of Bedford, &c. Governor of the Corporation of the great Level of the Fens, was pleased (without any Solicitation of mine, or of any of my Friends) to do me the Honour of proposing to the Corporation, at their last annual Court, that I should be desired to take a View of the Fens, and to give my Opinion relating to Mr. Leaford's Scheme.—*

*The*



*To the* READER.

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*The Corporation agreed to it, and his Grace obtained for me from the Right Honorable, &c. the Commissioners for building Westminster Bridge a leave of Absence for a short time.*

*As my Duty in complying with the Desire of that illustrious and publick-spirited Nobleman, perfectly coincided with my Inclination, I set out the latter End of June last for the Fens, which I found, especially the South Level, in a most deplorable Condition. I reported, in writing, the Result of my Observations, and my Opinion of Mr. Leaford's Scheme to the Gentlemen of the Corporation, who held a Meeting at Salter's Load on July the 4th last past, reserving to give them my Reasons till I had Time to draw them up after my Return to London.*

*The Chairman of that Meeting did then further desire of me in the Name of the Corporation, that I would also take a View of the remaining Part of the Fens; and if after my View any better Method should offer to my Thoughts, that I would impart it. I accordingly spent several Days more in viewing the other Parts of the Fens, and every where met with a great deal of Civility, and the most polite Treatment from the Gentlemen I had Occasion or Opportunity of conversing with; for which I return them my humble and hearty Thanks.*

*The Result of this View of the Fens, and what Method appears to me at present the most adviseable to follow, is the Subject of the following Pages, which are printed not only at my Desire, but by Order, and at the Expence of the Corporation of the Fens, that all Persons concerned may have an Opportunity to consider of what is proposed in time.*

*I have*

*I have been so hurried in drawing up this Report, that I am very sensible the Reader will find in it a great many Faults, especially as to Grammar or Stile, which I hope he will forgive for the sake of the Matter; and the rather so, if he pleases to consider, that I was neither born nor bred in England, but in Suifferland, and had neither Time nor Opportunity to have the English of it look'd over, and corrected as it should have been.*

*I conclude with observing, that any good Map of the County of Cambridge, and the adjacent Parts, will be sufficient to make what is said of the several Places in the Fens clear and intelligible; for which Reason, as well as for want of Time, no Map is annexed: But I have delivered to the Corporation particular Plans and Elevations of the Works proposed, which are to be laid before, and examined by the Gentlemen of the Corporation, and others, at their next Meeting at Ely. on the 16th of August next.*

Crown-Court, Westminster,  
August 8, 1745.



# ERRATA

The Reader is advised that the following list of errors is given for the purpose of correcting the same.

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*The Reader is desired, before he reads, to correct the following Errors of the Press, occasion'd by the Hurry in which this was printed.*

## ERRATA.

Page	Line	Instead of	Read
2	5	or some of	or more of
2	last Line	serve to the	serve for the
4	3	attending it is not	is not
4	6	some Inconveniencies	some other Inconveniences
9	5	diverting it, as	diverting, as it
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17	last Line	above	about
19	15	<i>Walterdyke</i>	<i>Westerdyke</i>
19	29	above	about
20	10	<i>Scarwands</i>	Seaward
22	10	old	new
29	2	not room	most room
34	18	<i>after the Word Land, insert</i>	<i>such as Sandwich River in Kent</i>
40	10	best	last
44	7	<i>Montes nascitur</i>	<i>Montes, nascetur</i>
44	11	pushing	puzzling
45	23	nor of what	nor what
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47	14	1548,00,000	1,548,800,000
48	26	<i>Nine Millions</i>	<i>Nine thousand Millions</i>
48	29	<i>Six Millions</i>	<i>Six thousand Millions</i>
52	26	Ports	Parts
62	29	<i>implies</i>	<i>empties</i>



Rains, or any other Cause; and, lastly, some Lands are also liable to be overflowed, and in want of being drained, when, by their low Situation, the Tides of the Sea are driven up to them.

# THE R E S U L T

OF A  
VIEW of the great LEVEL of the FENS,  
taken in JULY 1745.

I Presume that a Tract upon draining cannot begin more properly than by some general Observations upon the Subject.

Lands may be overflow'd, and in want of being drain'd from several Causes, some by the Rain-waters falling directly upon them in too great a Quantity, and having no sufficient Escape to run off.

Some Lands are overflow'd from their low Situation; the Rain-waters fallen upon the neighbouring higher Lands descending along the Surface, or filtrating through it till they reach the lowest Place, which is called, in the Fens, the *Soke*.

Some Lands are also overflowed, and in want of draining from the Swellings of the Rivers, Brooks and Streams which pass through them. Whether those Swellings proceed from

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Rains,

Rains, or any other Cause ; and, lastly, some Lands are also subject to be overflowed, and in want of being drained, when, by their low Situation, the Tides rise sufficiently to bring Sea-water upon them.

Some Lands are liable to be overflowed by one, or some of the Causes just now mentioned ; but the great Level of the Fens, called the *Bedford Level*, or at least the greatest Part of it is liable to suffer from all those Causes ; and in this, at least, the Level of the Fens, may very well be compared with all the Low Lands in the *Netherlands*, and the greatest Part of the States of the United Provinces.

Now the Methods of draining, or the Ways of remedying these Inconveniencies, are various, according to the Situation, the Nature of the Soil, the Materials at Hand, and the Means to execute what is intended ; but they may be all reduced to some few general Heads.

And, first, nothing can be a more natural and effectual Means to drain Lands than to make, or dig out a sufficient Number of Cuts ; no matter by what Name they are called, such as Ditches, Drains, Loads, Leams, Fosses, Canals, Waters, Eau's, Drovers, Gools, &c. in which the Land discharges the Water with which it is overloaded in the same manner as the Ditches which are cut along the Side of a Road, serve to keep that Road dry. There is nothing more to be observed in cutting those Drains but to shape them according to the Nature of the Lands through which they pass, to give a sufficient Slope to their Sides to hinder the Lands from falling or calving into them, and to dig them of such a Breadth and Depth as will answer the Purposes for which they are intended ; because some of those are not only Drains, but Fences and Boundaries of Lands ; and some are made sufficiently wide and deep as to serve to the Navigation of



of Boats, or larger Vessels. Common Sense tells us, that those Cuts or Drains ought to be kept clean; that is to say, the Weeds, Reeds, or Rushes that are apt to grow in them ought to be cut and removed, and the Silt or Mud taken out of the Bottom from Time to Time, and thrown upon the adjacent Lands, if no better Use of it can be made. Those Drains are carried on single, or are made to communicate one with another, according to the various Circumstances of the Lands, through which they are conducted, from the highest to the lowest Parts; where, in order to answer the Purpose, they must discharge their Water continually, or at proper times, either in the Sea, or in some Moors or Lakes, or in some natural or artificial River or Canal, which convey them either to Sea directly, or to some Lake, or other Receptacles, from whence they are conveyed to the Sea.

The next Consideration that obviously occurs with regard to draining, is that if the Mouths or Openings through which those Drains discharge the Land-waters, are subject to be overtop'd by the Rise of the Tides, or the swelling of the Rivers, or by both, it is then necessary (as is done in all such Places) to secure the Lands from the reverting of the Sea or River-water up into the Lands (when the Surface of them is above the Surface of the Waters in the Land) by placing at the Mouths of all the Drains, whether large or small, Breast-gates, Draw-doors, Tunnels, or Valves, or any other Contrivance which may answer the same Purpose.

Having said enough of those lesser Drains or Cuts which take off the Waters immediately from the Lands, I next proceed to consider of what is most necessary for those natural or artificial Rivers or Canals, into which the smaller Drains convey the Land-waters: In the first Place, nothing is more plain that the streighter and the deeper these

Rivers or Canals are, and the greater and quicker will be the Discharge of Water ; and for that Reason where the Expence attending it is not too strong an Argument against it, the making of streight Cuts, instead of crooked Rivers, has always proved of great Service as to draining, provided this be not attended with some Inconvencies, as it has happened in the Fens, as I shall take notice of more fully in another Place.

The next Consideration is that where Lands are liable to be overflowed by the Tides, or the swelling of Rivers, wherever proper Materials, and a sufficient Quantity are to be had, Nature points out the Remedy, viz. the embanking the Rivers, or Sea-shores ; and so are they all with very strong Banks in *Flanders, Brabant, Holland, Zealand, Friesland, Groningen*, made and maintained at the Charge of the Publick. ; and to come nearer home, so is the Province of *Marshland*, and a considerable Part of the Fens.

Moreover it is very evident, that as long as the Surface of the Water over the Lands is lower than the Surface of the natural or artificial Drains, Rivers or Canals which are to carry it off, those Lands can never be drain'd but by Exhalation, or Evaporation, which is much more considerable than the Generality of Mankind imagines, as I shall shew in another Place, or else Recourse must be had, as is done in *Holland*, and other Places, to artificial draining, by raising the Waters from the Land, and throwing them into the natural or artificial Rivers, which discharge them into the Sea at the latter End of the Ebb, by the Help of Engines, of which the Windmills ought to be preferr'd to all others, especially in Countries where the Wind cost nothing.

But the next material Point, in all Cases of draining, is to procure and maintain a sufficient Out-fall for those natural or artificial Drains and Rivers, to deliver their Land-waters ; and this,



this, though mentioned in the last Place, is of such a Consequence that all other Cautions, or Works done within the Land will be of no Service to draining, though never so expensive, unless proper and sufficient Out-falls be made and maintained: On the contrary, whenever the Out-falls come to be filted up, nothing remains to the Owners of the Lands whose Waters used to be conveyed to Sea through those Out-falls; but to pray for dry Years, in order to have the Water of their Lands evaporated; or else if the Lands are worth that Expence, to embank their Rivers if possible, and afterwards erect a Number of Mills sufficient to drain the Lands, which are then deprived of all other Methods of draining till their Out-fall, or Out-falls be recovered, or new ones obtained.

I cannot help observing in this Place that it is only with Respect to Out-falls that it may be truly asserted, that Navigation and Draining must go together; and that what will improve or distress the one, will also improve or distress the other: Since in almost every thing else, what is best for Navigation is worse for draining; and, on the contrary, whatever helps draining, hurts the Navigation of those Rivers which pass through Lands subject to over-flowings. For Example, it is of the greatest Advantage to Navigation that the Tides should run up in the Land as far and as high as possible; and it is not less evident that nothing can be more hurtful to fenny Lands, especially to those that are lower than even the Beds of those Rivers, since Sea-water is destructive to all Land Vegetables. Long Winters, cold wet Summers, and rainy Seasons or Years; and, in short, whatever may contribute to swell the Rivers do always improve the Out-falls of Rivers, and consequently the Navigation, by deepening and enlarging their Channels, and carrying to Sea great Quantities.

Quantities of Mud, or Sand, or whatever the Sea brings: But it is as certain that nothing can be more hurtful to fenny Lands than those very long Winters, wet Summers, and rainy Seasons, during which, or soon after, the Fens are, and must necessarily be greatly distressed. On the contrary hand, short Winters, long and hot Summers, and dry Seasons or Years; and, in short, whatever may contribute to drought, that is, to encrease the Evaporation, and to lessen the Quantity of Water in the Rivers, are of the greatest Advantage to fenny Lands, which are then in the most desirable Condition: At the same Time that the want of Land-waters, occasioned by those very dry Seasons, are most hurtful to the Navigation in general, and to the Out-falls of Rivers in particular, which are filted up in those Seasons by the Action of the flowing Tides; and what they bring, not carried away again for want of a sufficient Quantity of the Land-waters.

The last Observation, which I think necessary to make, with regard to the general Rules which ought to be observed in draining, is that the Waters should be conveyed from the Lands in as large Bodies, and as few in Number as possible, because there will be so much less Danger of their growing up, or being choaked with Weeds, over-loaded with Land-waters, or filted by the Sea: And it is for the same Reasons that nothing is more pernicious to the Welfare of Rivers, and consequently their Out-falls, and to draining, than the branching them from one, or at least a few considerable Streams into many more inconsiderable ones; and what is said of branching the large Rivers, is to be understood, of all Side-discharges, called sometimes *Slackers*, which ought never to be made or suffered to run but in Cases of the utmost Necessity, when the main Rivers are so full that their Banks, or the adjacent Lands are in Danger, by their continuing so any long



long Time : For common Sense, as well as Experience, has shewn that all such Side-discharges, Slakers or Branchings from the main Streams do at last end in destroying, or occasioning the silting up of those very Streams which they were intended to help.

It would be foreign to my Purpose to relate the antient State of the Fens for some hundred Years before the Corporation undertook the general draining ; those who are curious of these Matters may consult, among others, Sir *William Dugdale's* History of draining and embanking, and Mr. *Badeslade's* History of the Navigation of *Lynn* : These two Books contain a very full History of the Fens, particular Accounts of the many Attempts made at different Times towards draining them, and a great Number of useful Facts and Observations, well supported by Copies of the original Vouchers.

Whoever reads those Books with Attention will perceive, that, instead of conveying the Waters of the Fens, and of the Rivers, which brings the Upland-waters through them in large Bodies to their Out-falls at *Wisbeach* and *Lynn*, the only rational Method ; those Rivers, *viz.* the *Nea*n and the *Ouse* have been branched out and divided by several Cuts or Slakers, and a great Number of new Cuts, made in consequence of the Branchings of those main Rivers ; all which Undertakings, though attended with prodigious expences, served only as Palliatives, and temporary Benefits to some particular Places, and often proceeded from Views of private Interest in the Projectors or Undertakers, or the Owners of some Lands, but were in nowise conducive to a general draining, and to the Benefit and Improvements of Navigation in general.

So that instead of being dryer, or the Navigation being the better, the Fens did grow worse and worse, as well as the  
Navi-

Navigation, till the Waters of the *Ouse*, including the Rivers *Cam*, *Grant* and *Mildenhal*, which before went to the Sea by the Out-fall of *Wisbeach* (then very much decayed by Carelessness and Mismanagement) were turned by a Cut from *Little Port* into the *Brandon*, or *Little Ouse*.

Such a large Increase of Back-waters being brought to vent itself at every Ebb through the Out-fall of *Lynn*, was a rational and well-judged Proceeding, and perfectly agreeable to the Rules of draining; so it produced a very considerable Improvement to that Out-fall, and consequently to the Navigation in general, and to that of *Lynn* in particular, as may be seen at large in Mr. *Badeslade's* History; but, on the other Hand, it must be observed, that what proved so considerable an Advantage to Navigation, did not benefit in an equal Degree the draining of the Fens; for the Tides having now an Opportunity of flowing much higher up into the Fens, viz. as high as *Harrymeer*, the Lands on both Sides of the *Ouse* were the more liable to be overflowed by the Action of the Sea-waters beating back the Land-waters: But, upon the whole, I am clearly of Opinion with Sir *William Dugdale*, that, without a general draining, all these particular Attempts, how chargeable soever, would be of little Moment, witness *Morton's Leam*, *Popham's Eau*, *Londoner's Load*, and many others, which Cost, had it at once been bestowed on the main Work, might have gone far towards a general draining of the whole Fens: And what Sir *William Dugdale* means by the main Work, is, in my Opinion, to be understood thus; that if all the Sums that have been spent since, in temporary Expedients, had been laid out in making and maintaining good and substantial Banks where-ever they should be found necessary along the *Ouse*, and the several Rivers which fall into it; the Fen Lands, in the South Level, and  
part



part of the Middle Level, would have been as often dry, and upon the whole, as fruitful and as capable of further Improvement as any Part of *Flanders* or *Holland*.

In the same Manner, and following the same Rule, might the Middle Level have been drained, not by diverting it, as has been done, great Part of the Rivers *Ouse* or *Nean*, in several Cuts and Branches of no Use to improve the Out-fall, or of Service towards a general draining ; but by enlarging, and properly embanking of *Popbam's Eau*, and *Well-Creek*, and make them capable of discharging either at *Salter's Load*, or at the Mouth of the present Drain, called the *Tongs*, the whole Quantity of Waters of that Part of the Fens. And it appears to me, that the branching and dividing the River *Nean* has been one of the principal Causes of the Ruin of the Out-fall of *Wisbeach* ; and that, after a great many Trials, and expensive Projects, of Service at most to some few People, and to particular Spots of the Fens ; such Branchings have proved of Dis-service rather than of Service to the draining the Fens of the Middle Level.

In consequence of the same general Rule of draining, that the more Water is conveyed, or passes and repasses through the same Channel or River, the better and deeper it will be as well as its Out-fall. I am clearly of Opinion, that the whole River *Nean* ought to have been conveyed to the Sea through *Wisbeach*, either through *Morton's Leam*, reduced to a reasonable Breadth between two good Banks, or in the straightest Line that could conveniently be ; and no doubt is to be made ; but that useful Out-fall of the Fen at *Wisbeach* first came to Decay by want of Care in cleaning the Streams which brought the Land-water to it, by diverting those Streams into Branches for particular Purposes, by embanking the Marshes, and by the erecting Sluices at the *Horse-shoe*, just  
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below *Wisbeach* : For though that Sluice has been destroyed long ago, the Mischief being already done, the Land-waters, assisted by such weak Tides as are able to reach above the Town, have not been sufficient to remove the Sands which the Sea has brought there, and will bring in every River that has not plenty of Back-water at every Ebb ; more especially when those Rivers disembogue themselves in a flat sandy Bay, where the Tides set in right up into those Rivers, and not along the Shores, and bring so much loose Sands as they do in the Out-falls of *Wisbeach* and *Lynn*.

I have made no mention of the River *Welland*, it having been diverted for many Years from taking its Course through the *Bedford* Level ; and as to the North Level, the short Time allowed me to take a View of the three Levels, has not permitted me to make such Observations as are necessary to enable me to speak positively on this Head : However, from what I saw of *Shire Drain* at *Gunthorp-Sluice*, and what Information I had about *Thorney*, I believe the North Level may be kept drained much easier than either of the other two Levels. As to its Out-fall in the Washes, since the Winds and Tides always did, and always will affect or shift more or less the loose Sands that are in the Bay between *Lincolnshire* and *Norfolk*, the Out-fall will be kept clear from the Silt of the Sea, just in proportion to the Quantity of fresher or Land-waters, which come down through *Shire Drain* and *Wisbeach*, joined to so much of the Tide as may be suffered to run up *Shire Drain* and *Morton's Leam* without Danger of overflowing the adjacent Lands.

When I saw the *Neam* at *Peterborough*, which is there a very good River ; and remembered its pitiful Remains at *Wisbeach* and *Salter's Load*, I could not help making several melancholy Reflexions on the fatal Consequences of diverting,  
OF



or rather annihilating as it were, good Rivers, by branching them into several pitiful Streams, or Slackers : For though the same Effects do not always proceed from the same Causes, the converse Proposition is ever true, *viz.* that the same Causes will always produce the same Effects.

For Example, the Rivers *Nile* in *Egypt*, the *Rhône* in *France*, the *Ebro* in *Spain*, and the *Rhine* in *Germany* and *Holland*, are all very considerable Rivers, and would continue so quite to their Mouths, and be of great Service to the neighbouring Inhabitants if their Waters kept together in one large Stream or Body, as all, or most of the best Rivers do ; but it happens (not through Design, or the wrong Judgment of the People) through some natural Causes that each of these Rivers branches themselves before they reach the Sea into several Streams, which may properly be considered as so many *Slackers* to their main Streams, or to one another ; and the Consequence is in every one of those Rivers, that neither of those Branches or *Slackers* answer the Purpose of Navigation but in a very imperfect Manner ; and that these Rivers have their many Out-falls easily and often obstructed by the Sea-sands ; and are also the most apt to overflow their adjacent Lands.

And I cannot help mentioning, that for the same Reasons I foresee that if the *Tong's Drain*, which is one of the largest *Slackers* to *Well-Creek*, is suffered to run often, and without the utmost Necessity, which appears to me to be only when the *Well-Creek* is in Danger of overtopping its Banks, it will prove the Ruin of that main Discharge, and occasion a considerable Increase, and in time, perhaps, a total silting up at *Salter's Load*. What I have now advanced as to *Tong's Drain* is more or less true of every *Slacker* ; and therefore I shall take no further notice of them.

I am sensible that my insisting so much upon embanking will not be very agreeable to some of the Persons concerned in the Fens ; and I am sorry that any Truth should not coincide with their Views or their Interests ; neither am I unacquainted with what they can alledge against embanking. The chief Objections are no doubt, that the Nature of the natural Soil of the Fens being a Moor, is not at all fit to make durable Banks of itself, of which I own to have seen but too many Instances ; that better Materials to mix with it are not near at hand ; that they must all be fetch'd at a great Distance, and at a great Expence ; that the Banks do continually sink into the Moor, and, in a few Years, disappear ; and that the embanking all the Rivers of the Fens, which I seem to propose after all, as the most eligible Method towards a secure and general Draining, would amount to a prodigious Sum, and require a great deal of Time : And, lastly, that the Persons who were to be at the Expence of making Banks, perhaps 200 Miles in Length, are not at present, and perhaps never were in a Condition to defray so immense a Charge.

To which I answer, first from the Nature of Things, that Lands that are not worth embanking, ought to be intirely abandoned, or only made use of when dry Years drain them, and keep them so for some Time, by the exhaling of the Water without any other Art or Method. That I am sensible the moorish Soil of the Banks is very unfit of itself to make durable Banks ; but I know that there is Silt in the Out-falls, as also Clunch, good Earth and Clay in all the neighbouring Countries, with which, and the moorish Soil properly mix'd, good Banks have been made by the *Romans*, even against the Rage of the Sea-waves and Winter Winds, which have lasted already above 1000 Years with little or no Repairs ; and I have seen in my late View several tolerable good Banks, such



as those which enclose the *Ouse* from *Denvers* downwards, the walled Bank of the new *Podyke*, the North Bank of *Morton's Leam*, and others, which I need not name: That as to their sinking into the Moor, the same happens in *Holland*; but by the Addition of new Matter the Banks reaches the good Ground at last; after which, not only they want but little Repairs, but they grow so compact as to let no Water soak thro'. As to the Time which those good Banks would have required at first making, when the general Draining was undertaken; or whether the whole could have been done heretofore, or can be done at any Time hereafter without a national Charge, is, in my Opinion, little or nothing to the Purpose; since what I have said on the Head of embanking, was only to point out what appears to me would have been, after all, the best Method, though I am sensible that very often the best Methods are not followed for want of the Means, or other Reasons which I forbear to mention. But before I proceed to consider of what has been done, and of the Methods that have been followed, instead of embanking, I beg leave, in a few Words, to lay before my Reader, so far as relates to draining, the Case and Situation of the Lands in *Flanders* and *Holland*; under which I include all the Low Lands in the neighbouring Provinces. In *Flanders* there is hardly any large natural River that freely disembogues itself into the Sea, except the *Scheld*: This River is strongly embanked where-ever it is necessary, and more especially towards its Mouth where the Lands lie lowest of all, and the Tide is suffered to run up into it without any Hindrance several Miles above *Antwerp*, which is at a considerable Distance from the Sea: All the other Rivers, not only the natural ones, but their Canals, or artificial Rivers; many of which (but not all) run above the Soil of the adjacent Lands, all the Year round,

round, are all strongly embanked (for which they have indeed Plenty of good Materials at hand in most Places). Moreover all these inland Rivers are all sluiced, to keep the Sea out, and their extensive Navigation, much greater than that in the Fens, is chiefly performed by haling with Horses, and Locks erected where-ever it is necessary to change the Levels of those Rivers or Canals without any considerable Stop or Hindrance to their Boats and Vessels ; and as to draining, the Waters of the Lands are conveyed by common Tunnels through the Banks when and where-ever the Surface of the Waters in the Rivers will permit it ; and where not, it is raised by Engines, chiefly Windmills into those Rivers, and from thence into the Sea at every low Water, through either Breast-gates, which then open themselves, and shut again, as the Tide falls or rises, or through common Draw-doors, which Men, appointed and paid for watching Day and Night the Flow and Ebb of Tides, lift up, and let down again at proper Times.

In *Holland*, and the neighbouring Provinces, the Situation of the Lands is still less favourable, the most considerable River in it is the *Maese*, which brings down to the Sea part of the *Rhyne* along with it. This River is strongly embanked, and the Tide runs up freely into it several Leagues, not only above *Rotterdam*, but above *Dort*, without Interruption ; but all other Rivers, either natural or artificial, are not only embanked, and the Banks maintained at a national Charge, but the Sea is kept out of them by Locks, Breast-gates, or Draw-doors, through which their almost incredible inland Navigation is performed as in *Flanders* ; but what makes the Case of *Holland* different from *Flanders*, is that the Lands lie in general so low, as to be always under the Surface of the Rivers, and the Sea ; and their Soil is full as bad, and full as moorish as in the worse Parts of the Fens :

All



All which Difficulties, good Regulations, Patience, and a steady Industry have conquered. Their Banks are strong and well-made, by mixing divers Substances, and fortified with Timber and Brick-work where necessary: But being deprived in most Places of draining their Land-Waters into their Cuts and Canals by the common Methods of Valves or Tunnels, because of the very low Situation of their Lands, in respect to the Surface of those Rivers and Canals, they notwithstanding keep themselves, and their Lands drained by the Help of Engines, chiefly Windmills, well made, properly situated, and their Number suited to the Water they are to throw out, it being common in those Countries to see three or four Windmills playing from one to another; so that the Water is raised over a Bank sometimes twelve or fourteen Feet in Height perpendicular.

But to return to my Subject, having dwelt long enough upon what should have been done, to drain the Fens, I shall now add a few Words relating to what has been done in consequence of the general Undertaking for draining; which, after making such Observations thereon as the nature of the Subject requires, will also naturally lead me to relate the present State of the Fens, as I found them in my late View.

About the year 1650, Sir *Cornelius Vermuyden's* Scheme for draining the Fens was adopted by the Corporation, though strongly and very justly opposed by *Westerdyke*, and others; which Scheme, as I find it quoted in *Badeslade*, Page 45. from the original Discourse of Sir *Cornelius*, printed in 1641, was in brief as follows: that Sir *Cornelius*, Page 2d, "took  
" advice of the experienced Men in the Low Countries, and  
" did study from time to time how to contrive his Work for  
" the best Advantage;" afterwards in Page 7th, Sir *Cornelius* himself says, "There is in use a general Rule in draining and  
" gaining

“ gaining of drowned Lands, which is by embanking all the  
 “ Rivers on each Side, and by leading away the Downfal by  
 “ Drains and Sluices—but as the Rivers of this Level (the  
 “ South) fall crosswise into the *Ouse*, these Lands cannot be  
 “ made Winter-Grounds by the ordinary way of draining,  
 “ &c.”

“ Therefore the principal River, which is the *Ouse*, may  
 “ not go down through the Fens as it now does; but the best  
 “ way is to turn that River at *Erith*, into, and next unto (the  
 “ old) *Bedford* River, and to shut the Passage of the *Ouse*,  
 “ as it now goes, by a cross Bank through the River to the  
 “ firm Land, and so force it into that Course as now *Bedford*  
 “ River goes, whereby all the Lands below *Erith* will be  
 “ freed from the Overflowings of the *Ouse*.

“ And to the End that the Waters of the *Ouse* shall not  
 “ annoy the Country any further, the said *Bedford* River is  
 “ to be embanked on each Side thereof to keep the *Ouse*  
 “ within certain Bounds; the Banks thereof must be a great  
 “ distance the one from the other, so that the Water in time  
 “ of Extremity may go in a large room to keep it from rising  
 “ too high and the more; because there is a great Distance of  
 “ about 25 Miles from *Erith* before it comes to the perfect  
 “ Fall.” This was Sir *Cornelius Vermuyden's* Scheme; who  
 might, in my Opinion, have said to himself upon this Occa-  
 sion.

—————*Video meliora proboque,*

*Deteriora sequor,* —————

I am at a loss to know why Sir *Cornelius* chose to leave  
 what he owns as a general Rule in draining, on account of the  
 Rivers of the South Level falling crosswise into the *Ouse*, &c.  
 since I believe there is no River in the World that falls into  
 another, but falls into it more or less crosswise, and many  
 much



much more than these; but I suspect there were other Reasons which engaged the Corporation to decree, about 1650, that Sluices should be made cross the *Ouse*, near *Salter's-Load*, and at the *Hermitage*, in order to turn the Chancel of the *Ouse* into the new *Bedford* River, then decreed to be dug from *E-rith* to *Salter's-Load*. Mr. *Badeslade* boldly asserts, Page 48, " That the Expence of executing this artificial Scheme was " calculated at but 8000 *l.* less than the Charge would have " been of embanking the natural Rivers, and following the " known sure Rule of draining; and that there was so great " a Division among the Adventurers which Method to follow, " that the Majority for sluicing the River *Ouse* was but one " Vote; and that Majority was occasioned by the private Interest of —, who had some Lands in the South Level." For my Part, I am clearly of opinion with Lord *Georges*, *Westerdyke*, and many others, that embanking would have been the most eligible Method at that time; but as I am very willing to believe that every Person does contrive and act to the best of his Knowledge, I am of opinion, that what might have sway'd Sir *Cornelius* into that Advice, and the Adventurers in adopting it, is not so much the pretended 8000 *l.* Difference in the Estimates of the two Methods, because I know it impossible to calculate the Expence of either of the Methods to such an Exactness as to pretend to say the one would be cheaper than the other by 8000 *l.* and no more; but what I believe carried the Point was, that the Method pursued was reckon'd at that time at least as good as that which was not, and the time for the executing it, much shorter, and therefore preferable.

What I have to observe in relation to the new *Bedford* River is this, first instead of enlarging and deepening the old *Bedford* River sufficiently, a new River was cut above 100

D

Feet

Feet wide, and but 5 Feet deep; so that what with the Slackers or Cuts already existing or made since, and a little Stream preserved through the Sluice at the *Hermitage*, for the Use of the Navigation up the old Chanel of the *Ouse*, this River, instead of being carried into one Body of Water to its Out-fall, is to this day diverted into four or five Streams, all very inconsiderable, except the new *Bedford*, and consequently very liable to be choaked up with Weeds and Rushes, as I have seen them in my late View. But I think all such paultry Cuts of more Prejudice than Service to draining, since great part of their Waters soak through the Banks, and the moorish Soils of the Fens, and there stays till it be evaporated by the Sun and Winds. Moreover the new *Bedford* River being but shallow in comparison of the old *Ouse*, and lying much higher and freighter, the Tide could not run up into it so far into the Land, nor in so great a Quantity as when they were free to run up into the old *Ouse*, and into the Rivers which enter into it, and consequently the Out-fall loosing thereby a considerable Quantity of Back-water at every Ebb; it is evident Sir *Cornelius's* Scheme was hurtful to the Navigation of *Lynn* in particular; but as to the Article of Draining, it is certain it would have been of great Service towards draining the South Level if the *Ouse* had been the only River that went through that part of the Fens, but as the said new *Bedford* River received only the Waters of the *Ouse*, and was not cut of such a Breadth or Depth, and made to receive the Rivers *Grant*, *Mildenbal*, *Brandon*, and *Stoke*, the Cure intended was only a partial one: And it is certain, that had not the *Denvers*-Sluice, or some better Contrivance been built at *Denvers*, at that time, the new *Bedford* River being shallower, and lying much higher than the old Chanel of the *Ouse* at *Denvers*, its Waters must have had a much greater Velocity than



than in the old *Ouse*, and meeting with the flowing Tides twice every twenty-four Hours, would have run up jointly with those Tides into the old *Ouse*, and the Rivers that fall into it, and consequently overflow the South Level, even then very poorly embanked, at every Spring Tide, and at every Land-Flood, just as they do now, and have done ever since *Denvers*-Sluices have been destroyed: And Sir *Cornelius* was so sensible of it, that he projected *Denvers*-Sluice, at the same time as the new River of which I am speaking; but the Remedy was, as I shall presently shew, infinitely worse than the Distemper.

It plainly appears by what *Westerdyke* relates in the Brief of his Observations of what passed between him and Sir *Cornelius*, and his pretended Demonstration, that neither Sir *Cornelius* nor *Walterdyke* were Masters of so much Theory as to be able to determine what Water-way should be sufficient at *Denvers* for the Land-waters, whatever Knowledge or Practice those two Gentlemen may be allowed to have in other matters.

But the Reader must excuse me if I dwell a little longer upon *Denvers*-Sluices, and describe them a little more; for to that ill-formed, and still worse executed Project, I cannot help attributing the greatest part of the Mischiefs that have ensued, *viz.* the almost total Loss of an Out-fall to the Fens, the Ruin of the Navigation of *Lynn*, and the deplorable State of the Fens, especially the South Level in every wet Year, or after any extraordinary Tide.

First, the Breadth of the River old *Ouse* (which just above *Denvers* was then above 150 Feet wide, and has to this day 124 Feet free Water-way through *Downham*-Bridge, which is but a little lower) was reduced by Abutments of Brick, faced with Stone, to barely 80 Feet. Across this pitiful Out-

fall for so many Rivers, the People who executed it were suffered to build a solid Wall or Dam eight Feet perpendicular above the bottom of the old *Ouse*, depriving thereby the River, both above and below, of the greatest and best part of its Water-way. Over this close Dam were erected a Bridge and other Works that left only three Openings of 18 Feet wide each, which reduced all the Land-waters, coming down the old *Ouse*, to be wiredrawn through a 54 Feet Water-way: to compleat the matter, three pair of Breast-Gates, pointing to *Scarwands*, were placed over this Dam; whereby no part of the Flood-Tides was suffered to run up above *Denvers*. Lastly, so little regard was had to the inland Navigation, that no Lock was provided, nor any Contrivance to let the Boats pass when the Gates were shut, it being impossible to open those Gates, all the latter part of every Flood, that was not over-riden by the Land-water of the old *Ouse*; nay, the very Land-waters that came down the new *Bedford* River with Rapidity have kept those Gates shut, as is well known, for three Weeks together. Whoever was the Director of this Work, whether Sir *Cornelius* himself, or as I have been told, Sir *John Fitch*, of the Borough of *Southwark*, (a Man famous even to this day among the Boys for his celebrated *Fleet-Ditch*) must be taxed with an Ignorance which is almost criminal, if the Mischiefs and the ill Consequences thereof are attended to.

The immediate and necessary Consequence of this famous Sluice was, that for some time after it was erected the Lands on both Sides of the old *Ouse*, in the South Level, were dryer than before, being free from the Spring-Tides beating back the Freshes; but the solid Wall, built eight Feet higher than the Bed of the old *Ouse*, acted there just as such a Wall built across the *Thames*, for example, at *Greenwich*,  
would



would act here; that is to say, the Bottom of the River was filted up in less than two Years, till it reached the very top Surface of the Dam, the Bed above and below fitting itself to it in such Slope or hanging Level as Nature gives to the Bottom of all Rivers.

The next ill Consequence was, that there being so much less Back-waters coming through the Out-fall of *Lynn* at every Ebb, the Sea brought every flowing Tide a great Quantity of Sands, which lodged chiefly in the broad part of the *Ouse*, between *St. Germans* and *Lynn*, and also below the Town; which the Ebbs running but languidly, were utterly incapable of removing to the great Prejudice, not only of the Navigation of *Lynn*, but to all the inland Navigation, by raising the Bottom of the Rivers, and in a great measure choaking up their Out-fall to the Sea. And as to draining the Result of this ill-formed, as I said before, and worse executed Project was, that though the South Level was something better drained, on account of the Tides being hinder'd from running up, the River below *Denvers* being filted up eight or ten Feet higher than it was before, that general Out-fall of the Waters in the Fens was almost wholly lost, and in every wet Season the Land-waters having little or no Escape or Current to the Sea, they remained stagnated all over the Fens, there being no means left to carry them off but by Evaporations.

This was soon perceived to be the true State of the Case, and therefore to remedy this new Evil, in the year 1653, *St. John's Eau*, and *Tong's Drain* soon after, were cut at a very great Expence, in order to give, if possible, more Water-way to the Rivers and Waters of the Middle and South Level than they could possibly have through *Denvers* Sluice and *Salter's-Load*; but these, like all other Slackers, have made  
worse

worse what was already bad enough before, and the Sands increased more between *Salters-Load* and *Stow-Bridge* than in any other part of the River; so that the Out-fall of *Downham-Eau* was choak'd up in about three Years after it had been made; and has been disused for many Years.

Whoever reads Mr. *Badeflade's* History of the Navigation of *Lynn* will find the many and various Complaints of the Towns of *Lynn* and *Cambridge*, and many others, against the old *Ouse* remaining turned out from its old Course into the old *Bedford* River by the Sluice at the *Hermitage*, and against the Tides being hindered from flowing up as they used to do above *Denvers-Sluice*; however the *Denvers-Sluices* found Friends enough to defend them from all Attacks but those of the Tides, by which they were undermined, for want of Care in their Construction, and blown up in the Year 1713.

No doubt, great must have been the Expectations of those who had so long and so justly opposed those Sluices after this Accident—but in this they were also most grievously disappointed; for in the first place, the Mischief produced by the Sluices, that is, the silting up of the River *Ouse* eight or ten Feet, having been a Work of Time, in which the Sand and Silt had had time to grow firm and compact, was not so easily removed. Secondly, the chief Cause of the Mischief still subsisted; for notwithstanding the greatest part of *Denvers-Sluices* were blown up and destroyed, the solid Dam or Wall eight Feet higher than the original Bed of the River subsisted (and does subsist to this day,) which suffered but a very inconsiderable part of the Spring-Tides to run up, if compared to what they did before the said Wall was built; and as to the neap Tides they could not reach then so high as *Denvers*, no more than they do now, and therefore the Benefit



nefit of the Admiffion of the Tides through the Ruins of *Denvers*-Sluices proved much lefs advantageous to the Navigation than had been expected, and as to draining, it has made the South Level ever fince, the worft embanked of the three, the very Sink and general Receptacle of the Waters of the Middle Level and the Uplands; for in every wet Season or Land-Flood the Waters coming down the new *Bedford* River with a confiderable Current, and their Out-fall being almoft entirely filted up by the Action of the flowing Tides, thofe Waters found their way to the loweft place, as they muft neceffarily do; fo that inftead of running towards *Lynn* and the Sea, they took their Courfe into the South Level, through the Remains of *Denvers*-Sluices; which unnatural Courfe is ftill taken to this day in every wet Season or Land-Flood for many Days together, fometimes three Weeks, without any Intermiffion or Return.

And though this is a Fact notoriously known to all Perfons acquainted with the Fens, I think proper to infert here the following Affidavit, becaufe it explains very fully all the Circumftances of this unnatural Courfe of the Waters, and that only part of it is inferted in Mr. *Badeftade's* History of the Navigation of *Lynn*, and the two laft Paragraphs omitted by him for very obvious Reafons.

A  
**R E P O R T**  
 TOUCHING  
**LYNN Navigation.**

*In Cant. ff.*

**J**OHNN FULLER, Beakner, and Master Pilot of the Port of *King's-Lynn*, Captain *John Edwards* and Captain *Samuel Long*, Masters and Commanders of Ships of the said Port, and *Thomas Badeflade*, Gentleman, Surveyor, and Professor of Mathematicks; do severally make Oath that they at the Request, and by the Direction of the Mayor and Chief Magistrates of the Borough and Port of *Lynn* aforesaid, did on *Monday* the 20th day of *January* instant, take a View and Survey of that part of the River of *Great Ouse*, that is adjacent to the Place where *Denver Sluice* late stood, and were Three Hours before the Flood from Sea; where they were met by *William Strafford* Esq; and the Reverend Mr. *Peter Bateson*, Clerk, and all of them did observe, and do Certify and Report, that the Fresh Floods descending the *Hundred-Foot Drain*, otherwise called *Bedford River*, instead of having its due Course towards the Sea, did run violently through the Remains of *Denver Sluice*, toward *Ely* and *Cambridge*, at the time of our first coming thither, and continued so to do till the Flood Tide from Sea came up to that Place, and then both the Tide from Sea and Land-Flood united



united and run together up toward *Cambridge*; but the Tide did not put up into the *Hundred-Foot* River at all;

And do further Certify and Report, That they were informed by the Ferryman who constantly attended the Ferry there, and others inhabiting in those Parts, that the Tides and Land-Floods had continued to run in that Course and Manner up toward *Cambridge*, for at least a Week together, before our said View, without any manner of return to Seaward; and that the said Great River *Ouse* at the Ferry-Place, is silted up Seven Feet at least since the said Floods and Tides have had this Course :

That these Deponents did all of them ride about One Mile up the said *Bedford-River* Bank, to a Cross Bank in the Washes, and did there observe the said Washes, which are above Half a Mile over, and Twenty Miles in length, covered with a great depth of Water, and have good reason to believe the Flood will still continue running up toward *Cambridge* for some time longer : And do believe and assert, that unless some speedy means to prevent the Land-Floods from taking this awkward Course, contrary to their natural Out-fall to Sea, the River of *Cambridge* will, by them and the Tides, be intirely silted up, and in a short time both Navigation and Draining be wholly lost :

And the said *William Stafford*, *Peter Bateson*, and *Thomas Badeslade* severally make Oath, that several times this last Summer, they have observed, that the Spring Tides which put up into *Cambridge* River, did not ebb back, but kept running up through *Ely* Bridge for several Days, occasioned partly by the Indraught near and above *Ely*, and the Waters of the *Bedford* River over-riding the *Cambridge* River; and in its Ebb, all Spring-Tides flowing up the said *Cambridge* River at least One Hour, and sometimes Two Hours after the

E

Ebb

Ebb of *Bedford* River, which give so much time for the Silt from Sea to settle, that must in a short time, by that means, be quite choaked and lost :

And do observe, That the same River is already filted up, that the Niep Tides cannot reach or put up into the River of *Stoke, Brandon, Mildenhall, or Cambridge*, as they were wont to do ; and that the Harbour of *Lynn* being thereby deprived of its Great and Antient Receptacles and Returns of Back-Waters, does in consequence daily decay and grow worse, to the imminent danger of losing that Port and Navigation.

*John Fuller.*

*John Edwards.*

*Samuel Long.*

*Thomas Badeflade.*

*William Stafford.*

*Peter Bateson.*

Jur. apud Lenn Regis in Com.  
Norf. 22<sup>o</sup> die Januarii, Anno  
Domini 1723. Coram me

*Edm. Rolfe* in Cant. Mro. Extra.

As to the Reasons which Sir *Cornelius Vermuyden* gave for placing his Banks of the new *Bedford* River as far asunder as he had done when he embanked *Morton's Leam* for King *Charles I.* they appear to me far from being just ; on the contrary, I am forced, by the Evidence of the Arguments against it, and by Experience, to be of the same Opinion as *Westerdyke, Atkins*, and others, that is to say, that the Banks should not be far asunder ; and I cannot give the Readers better Reasons for it than those which were given in a Piece written by *Edmund Scotten* (in answer to *Vermuyden*,) who had



had been employed by the Earl of Bedford, published by order of the Committee of the Fens, and presented to the High Court of Parliament in 1642. This Piece is entitled,

*" A desperate and dangerous Design discover'd concerning  
" the Fen Countries.*

" Let Rivers be made large and deep (says the judicious  
" Author,) and there will be matter enough arising thereout  
" with the Indykes to make high Banks near on each Side  
" the Rivers. These Banks being made high, and but a small  
" Distance between, will be a Shelter to the Water that shall  
" run betwixt them, as a Hedge or Wall will shelter Cattle  
" that lie next unto them; so that the Wind will have no  
" power to raise violent Waves against these Banks, to tear  
" them as the others set at a great Distance: So that here is  
" one main Mischief prevented already.

" A Second Mischief will be hereby prevented, with a  
" Benefit in the room; for whereas such Banks (speaking of  
" Vermuyden's,) though placed at a great Distance, could be  
" made to hold, they would restrain the Waters of their former Liberty, and so cause them to rise higher in the Meadows above than formerly, and so do much hurt; which  
" large and deep Rivers will prevent. For as soon as the Flood  
" begins to rise in the Rivers above the Fens, it finds such  
" full and current Passage to Sea, that it is taken down as it  
" begins to rise; so as that which would have been a little  
" Flood before, will be no Flood now; and therefore in  
" Summer-Time will be much advantageous to their Meadows, causing their Grass to be less floated than before.

" A third Benefit by large and deep Rivers, with Banks placed near the Sides, is this: When a great Flood comes, it finds such a full and current Passage, that it will be gone

“ half into the Sea in such time, as without such Rivers it  
 “ will be climbing up to get above the Superficies of the Fens  
 “ between those Banks so far distant: for until it be got aloft  
 “ it can go but slowly (as is confess'd by Sir *Cornelius*,) want-  
 “ ing the Fall it had before; and the Hassocks, Reeds, Sedge,  
 “ and long Grass will hinder the Passage; and as soon as it is  
 “ aloft, the Wind will have power to raise violent Waves,  
 “ which will whinder the Banks to-pieces: For it must be  
 “ high against those Banks before the two Rivers will grind  
 “ out a Passage.

“ Now is it not much better that half a great Flood be  
 “ sent speedily to Sea, than to lie by the way tearing and  
 “ rending the Banks?

“ A fourth Benefit is—a small Flood or Rise of Water,  
 “ being pent up between Banks as aforesaid, will go with  
 “ Force down a deep River, and so scour, and keep open  
 “ the Out-fall, when the others lose a small Flood by the  
 “ way.

“ It is most apparent by what has been already said, that  
 “ when the Land-Floods shall descend from *Northampton*,  
 “ *Bedford*, or other upland Countries, and shall arise in  
 “ Height four or five Feet over the Superficies of the Mea-  
 “ dows, they will arise six or seven Feet high between his  
 “ Banks, though placed at a great Distance between them;  
 “ and when the Waters are thus aloft near the top of the  
 “ Banks, the Wind will have such a Power to raise violent  
 “ Waves against them that will break them and tear them  
 “ to pieces.”

In this last Paragraph is contained a true and lively Picture  
 of what happens in the Washes, between the two *Bedford*  
 Rivers and in *Morton's Leam*, the two Places where the Banks  
 are most asunder, and indeed, every thing else being supposed  
 alike,



alike, I found the Banks most wounded and lashed by the Floods, where the Waters had not Room to yield to the Action of the Winds, that is to say, the wider the Banks are from one another, and the stronger must they be made to resist the Waves in Floods and high Winds: Moreover I think proper to mention, in order to back sound Reasoning by Facts and Experience, that I have seen a great many Rivers embank'd in *Holland, Flanders, France and Spain*, where the constant Practice is this, to give but little Foreland between the common Line of the Water-edge, and the Banks in all the Rivers that are apt to swell, and none at all in those that are kept under by Locks or Sluices.

In the Year 1721, the Corporation of *Lynn* applied to the Corporation of the Fens for Redress, in respect to their decaying Navigation, who gave them for answer, that their Court was of Opinion, *That so much of the Rivers of Grant and Ouse, as run within the Bounds of the Corporation, are in a Condition sufficient for the Navigation, &c.* The next Attempt from the Corporation of *Lynn* was in the Year 1724, when the late Colonel *Armstrong* having been desired by the late *Earl of Lincoln* to take a View of the Fens, he made a Report of his Observations to his Lordship, and proposed a Remedy; the Substance of which is as follows:

*Substance of Colonel ARMSTRONG's Report.*

I. "To open the old *Ouse* from *Harrimeer* to *Hermitage*, near *Erith*, to its antient Breadth and Depth; and with the Earth that comes out of it, form Banks on the Side thereof to prevent the Land-Flood or Freshes overflowing the adjacent Lands in the Winter.

II,

II. To remove the Gravels near *Stretbams*, or where-ever else they are to be found in the River *Ouse*; as also all other Impediments. To the End, the Land-Floods, whenever they descend, may find a quick Passage to Sea, and carry off all the Silt and Sand they meet in their Way.

III. To take up the Remains of *Denvers-Sluices*, or make a new Cut just by them to render the River (now but 80 Feet wide) in this Place 150 Feet wide, as it formerly was: So that the Tides may have full Liberty to flow up by the *Ouse* into their ancient Receptacles, viz. the Rivers *Stoke*, *Brandon*, *Mildenball* and *Grant*, which will contain a sufficient Indraught of Back-water for deepning the *Ouse* upon its Return, and thereby restoring its Navigation (within Land) as well as giving the Land-Floods, when they descend, a swifter passage to discharge themselves by the Port of *Lynn* into the Sea: And that this may be more effectual, it will be necessary,

IV. To make the River *Ouse* as wide as it ever was known to be at each of the Bridges now subsisting at *Downham*, *Stow*, *Magdalen's* and *Germans*, by taking away the *Brush-Wood*, &c. put down to narrow it at those Places.

V. To take up the Sluice or Soss at the *Hermitage* upon the River *Ouse*, near *Eritb.*: And if it should be thought necessary to set it again in the *New Bedford* River, or 100 Feet Cut near the *Hermitage*, for the Benefit of Navigation, and thereby to send the Land-Floods down the River *Ouse* their natural Channel, &c."



I never intended to take upon me to examine all the Schemes proposed for the Relief of the Fens, that would be a very laborious Task, and of very little Service in my humble Opinion : However, as to such as shall fall in my Way in the Course of my Narration, I shall not think it much to say a Word or two upon each. And first in respect to the Remedy proposed by the late Colonel *Armstrong*, I must observe, that supposing the Corporation had a mind, and sufficient means to bring the old *Ouse* into its old Channel, by clearing it, and embanking it from *Erith* to *Harrymeer*. This expensive Project must, however, be postponed till the remaining Part of the *Ouse*, from thence to *Dunvers*, and the *Grant*, *Mildenhall*, *Brandon*, and *Stoke* Rivers be also embanked strongly enough to support the Weight of all the Land-Floods opposed by the Tides. If ever this was done, I should think the Colonel's Scheme a very good one, but not till then ; for those Rivers running almost every where above the Soil of the Fens (whether this proceeds from the silting up of the Bed of the Rivers, or from the sinking and settling of the Grounds of the Fens) every Land-Flood, or every Spring-Tide would make the Waters of the old *Ouse* overflow the whole South Level. As to what the Colonel mentioned of *Brush-Wood* under the four Bridges below *Dunvers*, I found this *Brush-Wood* to be large rough Timbers and Trunks of Trees, with which the Inhabitants near those Bridges think proper to fill up as close as they can, the first Opening at least, on each Side of those Bridges, with an Intention, I suppose, to hinder the Land-Floods from gulling away the earthen Banks, which serve as Abutments to those Bridges ; but as this Practice (as I am informed) is contrary to several Statutes in Force, and that there are other Methods

to

to secure their Abutments, I am intirely of the Colonel's Opinion as to that Point, and wish proper Orders were issued for clearing the River *Ouse*, already but too much contracted, from all such Incumbrances.

Much about the Time of Colonel *Armstrong's* making his Report, the late Mr. *Charles Bridgeman*, Gardener to his Majesty, and one of the most famous in *that Art* was also desired to deliver a Scheme after he had taken a View of the Fens. His Scheme, after approving all the Works done by the Corporation, and justifying them as well as he could, was little more than an Improvement of a former Scheme, proposed in 1649, by Colonel *William Dodson*; for both proposed to bring the Water of the North Level into the *Nean* below *Wisbeach*; and from thence cross *Marshland* into the *Ouse*, near *St. Germans*; and both of them also proposed intirely to exclude the Tides from running up into the Rivers; Colonel *Dodson* stopping them by Locks or Sluices near *Magdalen's*, and Mr. *Bridgeman* just above the Town of *Lynn*, where the *Ouse* was to come thro' a new River cut streight from *St. Germans* to the Tail of *Lynn* Harbour, and about 200, or 250 Feet wide.

The same Year Captain *Perry* proposed a Scheme much to the same Purpose, that is to say, to cut a new narrow Cut from *St. Germans* to *Lynn*, and to stop the Tide flowing up by three Sluices, one at the End of the new Cut, near *Lynn*; the next about half way to *Denvers*, and the other above *Denvers*; and by these Sluices the Captain asserted, *He could scour and deepen the River and Harbour to whatever Depth shall be desired from the uppermost of them down to the Low-water Mark in the Sea.* In respect to these three Schemes last mentioned, or any other Scheme that propose to stop the flowing up of the Tides into the Rivers, which take their



their Course through the Fens, and propose to maintain or improve any Out-fall by means of Sluices, and artificial Scours, made by the help of Reservoirs, or relieving Basons and Sluices. I must observe, that where-ever the Tides flow and ebb, there is no Harbour, or Mouth of a River that ever can be preserved from silting up, or contracting dangerous Bars at their Entrance, without very plentiful Back-waters ; and that Land-Floods, and fresh Waters alone are not sufficient of themselves without Indraughts of the Tides, to keep open any deep Chanel for Navigation, and drive out the Sand or Mud, which the Sea must, and does bring in at every Flood ; and I don't remember one single Instance against this general Rule. On the contrary, *Boston, Spalding, Wisbeach, Lynn, and Rye, in England*, are woful Instances of the fatal Consequence of restraining the Tides, either by Sluices, or by embanking too much of the adjacent Low Lands, which has occasioned an almost total Loss of a Harbour, and of a good Out-fall in every one of these Places ; because the Land-waters and Freshes are in a manner lost as soon as they come to spread in a much larger Room than they had done before, and have but little Power or Strength to do Service, without the Tides, as Sir *Cornelius Vermuyden* himself has well observed in his printed Discourse. It is true, indeed, that some Harbours have maintained themselves in a tolerable Condition in the *Baltick and Mediterranean Seas*, by the natural Help of their Back-water only, or by means of Reservoirs, or relieving Basons and Sluices ; but the Reason of this is evident enough, since in those Places there is no sensible Tides, and the Sea brings little or no Silt.

As to artificial Scours by means of Reservoirs, or relieving Basons and Sluices, *Effects are always proportionable to their Causes* ; that is to say, the Advantage to be expected from

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any

any Reservoirs, whether made by Nature or Art, is always in Proportion to the Greatness or Magnitude of those Receptacles, and to the Smallness of the Obstructions which they are to remove. To give some Instances of this, there are several fine Harbours in *England*, as well as in other Parts of the World, which have no other Help to clear their Mouths from the Silt of the Sea, but large Reservoirs, or Receptacles for the Tides; such are the fine Harbours of *Portsmouth*, *Plymouth* and *Falmouth*, (which I have seen) the Land-waters brought by the Rivers which fall into those Receptacles being very inconsiderable, and utterly incapable of preserving so deep Channels of Water as are to be found in those Harbours.

And as to artificial Reservoirs, the good that can be expected from them, as was said before, is in proportion to their Greatness; so that in those Places (and there are but very few such) where a whole River extending many Miles upwards, containing vast large Quantities of fresh or Sea-Water, can be often kept full without any Danger to the adjacent Land; such Reservoirs, or artificial Receptacles being let off at Low-water, and being able to continue running in plenty for a considerable Time with great Velocity, must certainly have a good Effect; but the Charge of making such large artificial Reservoirs (unless as was mentioned when a whole River can be had) is so immense, that the Generality of the Projectors content themselves with very inconsiderable ones, which produce proportionable, that is to say, very inconsiderable Effects; and unless there is Plenty of Water, and proper Convenience to scour and clean those very Reservoirs, which is seldom to be had, those Reservoirs are silted up, and become useless in a very little Time, of which I could give many Instances, but I will only mention one: About the Year 1730, the late Captain *Perry* undertook to drain *Deeping Fens*, and clear



clear its Out-fall, by penning up the Waters by means of Sluices ; but his Method proved intirely ineffectual, and after an Expende of about 6000*l.* the Work was given over.

I think proper also to mention in this Place, that there are some large Receptacles for the Tides, made by Nature, which have not always the Effect that one could naturally expect from them, as to cleaning their Mouths or Entrances from Silt : And the two Instances which occur to me now, are the Receptacle of *Braydon* above *Great Yarmouth*, and the Receptacle between *St. Germans* and *Lynn* : As to the former, I suspect that the Direction of the River below *Yarmouth*, with respect to the Settings of the Tides of Flood and Ebb may be one of the chief Reasons why so great and convenient a Receptacle joined to a great deal of Land-waters, does not clear the Bar before its Entrance ; and I believe it far from impossible to find a Remedy to that Evil ; but I have not made the necessary Observations to enable me to say any thing more on that Subject ; besides that it is foreign to my present Purpose : As to the last, *viz.* that wide Part of the River *Ouse* between *St. Germans* and *Lynn* ; the Reason, in my humble Opinion, why it does not act so forcibly as such Receptacles do at *Portsmouth*, *Plymouth*, or *Falmouth*, is that the Tides are so remarkably foul on this Coast, that the Sea brings in more Sand, and Silt in proportion to the Opening through which it passes, than in other Places, which must be, and is left below and above *Lynn*, and there remain, more or less in Height and Quantity, in proportion, as there are more or less Land-waters joined to the ebbing Tides to carry it to Sea again ; nor can it ever be expected, that there should be deep Water in that Receptacle, and below *Lynn*, till the River *Ouse* is restored to its former Depth and Current : The Consequence of which is, that though this Receptacle is

even at present very considerable, being upwards of severl Miles in length, and above half a Mile in breadth, at an Average, it is not filled till the Tide is considerably made, and contains much less Water than if it was clear from those Sands : So that when the Tide has so far ebb'd out at, and below *Lynn*, as to be contained in one, or few small Channels, which is the Time that the Back-waters are of greatest Service, the Receptacle is already almost empty, or at least does not contain a sufficient Quantity of Water to produce so considerable an Effect as might be expected ; however, I am very clearly of Opinion that such as it is, it is of considerable Service to the Port and Navigation of *Lynn* : And as to the severl Projects that have been made to restrain it into a reasonable Breadth ; for Example, so as to widen gradually from the Breadth it has at *St. Germans*, to the Breadth it has at *Lynn*, and no more, I believe it practicable, and am of Opinion at present, that it might be done for less Money than opening thro' the Land a new River, in a direct Line, between the two Places last-mentioned : I believe, also, that the inland Navigation from *Lynn* upwards, through such a Cut, would be as easy and convenient, and perhaps more so than in the present crooked Course of the *Ouse* ; and that it might be made of such a Breadth and Depth as to be very sufficient to carry off the ebbing Tides, joined with the greatest Land-Floods that can pass through *St. German's* Bridge : But as this Cut would certainly lessen the Indraught of the flowing Tides, which is very considerable in so large a Receptacle ; and the flowing of the Tide thereby continued much higher than it would in a lesser Cut or River, according to the first Law of Motion, by which Solids or Fluids, once in Motion, continue in that Motion till they are stopt by an external Cause ; and as such a new Cut or River must certainly receive and contain

still



still less Water on every flowing Tide, than the present crooked Receptacle, I am of Opinion, and ever shall be, till better Reasons be given than any of those which I have seen hitherto, that such a new Cut would prove of more Detriment than Service to the draining the Fens, by its lessening one of the Means of preserving a good Out-fall to the Sea, and prejudicial to the Navigation of the Port of *Lynn*.

I shall now proceed in my Narration: After many Conferences held in *London* in 1724, between the Corporation, and the Gentlemen of *Lynn*, none of the Schemes proposed were resolved upon, nor has any thing been done since towards a general Draining.

However, about the year 1729, Mr. *Thomas Badeflade*, whom I have had occasion to mention and quote more than once, published a new Scheme for draining the Fens; of which Scheme, as well as of its Author, I think it absolutely necessary to take a particular Notice.

Mr. *Badeflade*, in my humble Opinion, was certainly extremely well qualified, both as to Knowledge and Experience, for giving his Opinion in any Undertaking of this nature; but surely when a Project is grounded upon Calculations, as was that of Mr. *Badeflade* in 1729, the utmost Care ought to have been taken, to evince the Truth of every one of the Suppositions or Assumptions on which the Calculations and the Project depends: of which I shall say more presently. After observing, that in 1724 Mr. *Badeflade*, and the Corporation of *Lynn* entirely adopted Colonel *Armstrong's* Scheme already mentioned, as may be seen at large in Mr. *Badeflade's* History of the Navigation of *Lynn*, and in a printed Answer to Mr. *Bridgeman's* Scheme. But many Persons are of Opinion that *As Mr. Badeflade was the Person who made all or most of the Surveys and Observations which Colonel Armstrong mentions*

mentions, in his Report; so Mr. Badeslade was also the Person who drew up the Scheme to which the Colonel gave the Sanction of his Name: But be that as it will, I have already delivered my humble Opinion of that Scheme. And now I proceed to examine Mr. Badeslade's new Scheme, as printed in 1729; in order to which I shall quote or reprint the Title, part of the Preface, the Calculation at large, and the Conclusion or Project of Mr. Badeslade, by which the Reader will be the better able to form his Judgment, both as to the Author's Stile and Abilities, and to the Scheme itself; which is contained in a Pamphlet, well printed in a small Folio, of only twelve Pages, and is thus entitled:

“ A Scheme for draining the great Level of the Fens  
 “ called *Bedford-Level*; and for improving the Navigation of  
 “ *Lynn-Regis*: Founded upon *Self-evident Principles* in *Ex-*  
 “ *perimental Philosophy* and *Practical Mathematicks*, and  
 “ upon *Historical Faëts*.

“ And farther *demonstrated* by comparing the *River Ouse*  
 “ with the *River Thames*, &c. and *Lynn-Harbour* with the  
 “ *Harbour of Rye*. With *Reflections* upon all the *Schemes*  
 “ hitherto proposed for draining the Fens; shewing wherein  
 “ they are defective. Also *Observations* upon *artificial Scours*:  
 “ Shewing where, and in what Cases they are, or can be of  
 “ Use; where not. *Illustrated with a Map*. By *Tbo. Ba-*  
 “ *deslade*, Author of the *History of Lynn Navigation* and of  
 “ draining the Fens. London printed, and sold by *J. Ro-*  
 “ *berts*, near the *Oxford-Arms* in *Warwick-Lane*; *Charles*  
 “ *Harwick* at *Lyn*, and *William Thurlbourn* at *Cambridge*.  
 “ M.DCC.XXIX. No more than 150 Copies printed. (Price  
 “ two Shillings.)”

“ The



## " The Preface.

" *The many very different Schemes that have been proposed*  
 " *to drain the great Level of the Fens evidently prove that*  
 " *this Subject is not rightly understood. Indeed to be Master*  
 " *of so difficult a Business, require not only experienced Me-*  
 " *chanick-Practice in making Drains, Sluices, Banks, Scours,*  
 " *&c. but also speculative Knowledge relating to Rain, Tides,*  
 " *Laws of Motions, Out-falls, &c. in which all the Pro-*  
 " *jectors seem, by their Writings, to have been defective.*

" *'Twas necessary to make their own Surveys and Draughts*  
 " *in order to form accurate Ideas of the Country to be drained,*  
 " *&c.—To have thoroughly studied the History of the Fens,*  
 " *and Fen-Rivers, towards forming a right Judgment, &c.*  
 " *—To have Philosophy to discover the Quantity of Rain-*  
 " *Water that distresses the Fens every wet Year, in order to*  
 " *calculate what Dimensions Banks and Drains should be of,*  
 " *&c.—To have Mathematicks to find out the Velocity of*  
 " *Water in time of Floods, according to its Height; to*  
 " *know what Quantity, in a known time, run through a*  
 " *known Space, in order to calculate what Dimensions the*  
 " *Out-fall should be of, to disembogue the Freshes in convenient*  
 " *time into the Sea, &c.—To have studied the Doctrine of*  
 " *Tides, and Laws of Motion, in order to find out their*  
 " *Uses in keeping open the Rivers and Out-falls; and which*  
 " *they effect in a manner so wonderful, as cannot be conceived*  
 " *by those who have not well studied them: And from what,*  
 " *but a want of an aggregate Knowledge of these things,*  
 " *equal to the complicated Business of Draining, can so many*  
 " *different Opinions of Engineers upon the same Subject be*  
 " *accounted for, when there can be but one best of draining*  
 " *the Fens.*"

The

The next six Paragraphs of Mr. *Badeslade's* Preface, contain nothing material, being meerly inserted to abuse the following Gentlemen, viz. Sir *Cornelius Vermuyden*, *Bavents Westerdyke*, Colonel *Dodson*, Lord *Gorges*, Mr. *Chicheley*, *Kinderly*, and Captain *Perry*, for not having been of Mr. *Badeslade's* Opinion, even before they, or any body else knew what his Opinion was : But as I believe that every one of those Gentlemen, and every Person who proposes a Scheme does it to the best of his Knowledge ; I shall suppress the Scandal, and give only the best Paragraph of this Preface, which concludes thus :

“ *So inconsistent are their Opinions, and their Schemes*  
 “ *having no other Foundation than Opinion, they are widely*  
 “ *different from one another ; and yet each Projector would ar-*  
 “ *bitrarily impose his own Design, and would have People*  
 “ *take his Word it will exsiccate the Fens, though his Scheme*  
 “ *be against Reason, Experience, or the Rules of draining :*  
 “ *I therefore need not make any Apology for opposing to these*  
 “ *Superficial Schemes, founded upon Opinion only, a Design*  
 “ *for draining the Fens, and improving Navigation, founded*  
 “ *upon philosophical and mathematical Truths, which are in*  
 “ *themselves self-evident to Men who have acquired those*  
 “ *Principles of Knowledge.*”

Must not a Reader's Expectations, after all this, be very great ? or can it be possible to refrain from exclaiming ?

*Quid Dignum tanto feret hic promissor hiatu ?*

But instead of making any Remarks on this pompous Title, and bouncing Preface, I shall next insert Mr. *Badeslade's* Calculation at large, prefixing Numbers to his Paragraphs for the easier referring to them hereafter.

I. It



I. " It has been experimentally proved by Members of our  
 " *Royal Society*, and by Members of the *Royal Academy* at  
 " *Paris*, that one Year with another there rains Water e-  
 " nough in *France* to cover the Ground it falls upon thirteen  
 " (which should have been printed, as certainly the Author  
 " meant nineteen) Inches in Height; in *England* higher.

II. " The Springs, Brooks, and Rivers that empty them-  
 " selves into the *Ouse* at *Salter's Load*, are furnished with  
 " Water rained upon 3000 square Miles of Land (as you may  
 " measure upon the Map.)

III. " There rains upon that Scope of Country, one Year  
 " with another, at only eighteen Inches in Height, on the  
 " Surface 41,807,598,000 cubic Yards of Water. If one  
 " third of this Quantity be exhausted by Sun and Wind,  
 " and one third retained in the Earth for the Uses of Vege-  
 " tation, and one third only supply the Springs and Rivers;  
 " this one third Part, viz. 13,935,866,000 cubic Yards of  
 " Water will keep the Fens drown'd almost the whole Year,  
 " even though the Freshes keep running to Sea, uninterrupted  
 " betwixt Banks, to a Height four Feet above the Soil of the  
 " Fens, all Winter: For the River *Ouse* is so narrow below  
 " *Salter's Load* (being but 105 Feet wide at the Bridges) that  
 " it cannot vent the Floods in tolerable Times; but I'll cal-  
 " culate at 120 Feet the Width of the River in the other  
 " Parts between the Bridges.

IV. " The whole Body of a Land-Flood running at the  
 " rate of 200 Feet *per Minute*, through the River *Ouse*  
 " (which is a greater Velocity than ordinary, taking Top,  
 " Middle, and Bottom of the Stream) and uninterrupted in

“ a Body 14 Feet deep in Winter, which is the greatest *Body*  
 “ it can run in (when the River is clear of Sands, and deep  
 “ as ever known to be) not to break *Banks*; and will then  
 “ be four Feet above Soil; even then the River *Ouse* can't  
 “ vent above 9,000,000,000 cubic Yards of Water in the  
 “ Winter Half-year: And in the Summer Half-year, if the  
 “ Water run in the River one Foot only under Soil, *viz.* in  
 “ a *Body* nine Feet deep, and at the rate above-mentioned  
 “ (which it cannot do) the *Ouse* can vent but 6,242,245,000  
 “ cubic Yards of Water in that half Year; that is, in the  
 “ whole Year 15242,245,000 cubic Yards of Water; but  
 “ a third Part of the Water that is rained in one Year, is  
 “ 13935,866,000 cubic Yards: Therefore the *Fens* would  
 “ be drowned in their own down-fall Water all the  
 “ Winter, and most Part of the Summer, if the *Ouse* was  
 “ now as deep and as wide as ever known to be, and the  
 “ *Fen's Rivers* all *imbanked* according to this Calculation.

V. “ But two thirds of the *Rain* falls into the Winter  
 “ Half-year, when there is but little *Heat* to *evaporate* any  
 “ Part of the Water: So that most of it runs down the de-  
 “ clining Grounds into the *Rivers*, and causes great *Floods*,  
 “ and oftentimes *Snow* suddenly disolving, causes greater  
 “ *Freshes*.

VI. “ In the Winter Half-year, therefore, there may fall  
 “ upon the 3,000 square Miles that supply the *Fen Rivers*  
 “ 27976,732,000 cubic Yards of Rain-water: If one third  
 “ of this Water be waisted by the *Earth* and *Exhalation* in the  
 “ Winter Half-year, there will be to be carried through the  
 “ *Ouse* to *Sea* in that half Year, 18,647,821,334 cubic Yards,  
 “ but that River can vent but 18,000,000,000 cubic Yards of  
 “ *Water*



“ Water in a whole Year, though it kept continually running between *Banks* at a Height four Feet above the Soil of the *Fens*; consequently the *Fens*, after a wet Winter, must be drowned all the next Summer in their own *down-fall Water*, unless the Sun exhale it, even though all the *Brooks and River-waters* were conveyed to *Sea* between *Banks*: But no *Banks* can confine a sudden great *Fresh* while the *Out-fall* is so narrow.

VII. “ Again to run off the *down-fall Waters* through *Sluices* into the *Rivers*, the *Rivers* must run under *Soil*. The *Ouse* can vent no more (in a Year) than 12,484,490,000 cubical Yards of Water running a Foot under *Soil*; but there will be brought into the *Fens* six thousand Millions of cubic Yards of Water in a wet Winter more than can run through the *Ouse* to *Sea* in a whole Year: Therefore the *Fens* must be drowned for want of the *River Ouse* being wide enough to convey the High-country Waters to *Sea*, by those Waters, and their own *Downfall*, until by the help of *Sun* and *Wind* they are a little relieved.”

*Parturiunt Montes*————

If Mr. *Badeflade*'s Calculation was true, *Lord have Mercy upon the Fens*; for how is it possible they should ever be dry, since, according to him, above six thousand Millions of cubic Yards of Water are brought into the *Fens* every wet Winter more than can run through the *Ouse* to *Sea* in a whole Year: But before I shew the many Blunders in the Numbers, and Fallacies of reasoning in this Calculation, let us see what new Method or Remedy Mr. *Badeflade* proposes to drain the *Fens*.—Why only this:

" To make the River Ouse, from Denver to Seaward, wide  
 " enough to receive and convey through its Banks the High-  
 " country Freshes, which, for want of room to get to Sea in  
 " reasonable Time, do overflow and hurtfully surround the  
 " great Level of the Fens." And therefore I may as well  
 quote the whole Verse :

*Parturiunt Montes nascitur ridiculus Mus.*

The good People of the Fens need not be frightened, I do  
 assure them, (and I'll make it out presently) their Case is not  
 so desperate as Mr. *Badeslade* has represented it : For without  
 pushing themselves with Numbers, and Calculations, this  
 short Argument, I believe, will be sufficient to make them  
 easy.

If Mr. *BADESLADE's* Calculations were true, the Fens  
 must necessarily be always under Water ; but the Fens are very  
 often dry, and therefore Mr. *BADESLADE's* Calculations must  
 needs be false. Now I shall examine these Calculations.—  
 The first Assertion of Mr. *Badeslade*, in Paragraph (I.) is  
 certainly true, viz. That one Year with another there rains  
 Water enough in France to cover the Ground it falls upon,  
 nineteen Inches in Height ; in England more.

In order to prove this, I hope my Reader will not be sorry  
 to see an Account (which may be depended upon) of the  
 Rain that has fallen during the Course of the following  
 Years, in or about *London*, in Inches and Decimals.

*Viz*



		<i>In. Dec.</i>
<i>Viz. in</i>	1736	21,435
	1737	20,175
	1738	19,480
	1739	23,340
	1740	15,300
	1741	16,550
	1742	20,607
<hr/>		<hr/>
Total of the Rain fallen in 7 Years		136,887
Which gives for one Year at an Average		19,555

And therefore Mr. *Badeslade's* Assumption in Paragraph (III.) is a very just, and modest Assumption, which may be agreed to, the rather as the Medium of Rain in *England* is computed at 22 Inches.

In the Paragraph (II.) he asserts, that the Water which takes its Course through the Fens, *is rained upon 3000 square Miles*; which may likewise be allowed, upon sight of a Map, which shew the Ground rained upon, may be reckoned 75 Miles by 40, or 60 Miles long, and 50 Miles wide: But it is not true that all these Waters *empty themselves into the Ouse at Salter's Load*, since great Part of them are carried to Sea through *Wisbeach*, and a considerable Part through *Shire Drain*, neither of which Mr. *Badeslade* has taken into his Calculation, nor of what the River *Welland* carries to Sea.

The next Supposition he makes in his (III.) Paragraph, *that only one third of the Rain-water is exhausted by the Sun and Wind, is not true*; and first he has been mistaken as to that Quantity of Water, which he computes at 41807,598,000 cubic Yards: For since a Mile is 1760 Yards long, a square  
Mile

Mile contains 3,097,600 square Yards; 3000 such square Miles will contain 9292,800,000 square Yards, which covered 18 Inches high, contains 4,646,400,000 cubic Yards; one third of which is only 1,548,800,000, and one sixth, or the half of this, of which we shall have occasion hereafter 7744,400,000 cubic Yards: Whereas Mr. *Badeslade's* Numbers of cubic Yards require no less Ground than 27,026 square Miles to be supposed rained upon 18 Inches high, which is a Supposition not to be suggested with regard to the Fens. Now if Mr. *Budeslade* had had an Opportunity, before he framed his Calculation, to peruse what the Reverend Dr. *Hales* relates in his *Vegetable Staticks*, Vol. I. Page 55, and the following, he would have known that full one third of the Rain-water is evaporated from the Earth, even in the Shade, besides what the Sun exhales, or the Winds carry off: Moreover, if Mr. *Badeslade* had consulted the *Philosophical Transactions*, No 381, he would have found that the Action of the Sun is so considerable, that, joined to the natural Evaporation, it lessens a Surface of Water about  $\frac{1}{12}$  of an Inch in a Day at an Average, which if it continued throughout the Year would amount to near  $30\frac{1}{2}$  Inches; to which I may add, from my own Observations, that the Evaporation of any Surface of Water is much increased by the Action of the Winds: For I have found by several Experiments, that a fresh North-Easterly Wind, which is one of the most drying Winds, has lessened the Depth of standing Water full  $\frac{1}{4}$  of an Inch in six Hours, without any Sun-shine; all which plainly show that much more than one third of the Rain is evaporated out of the Fens, and adjacent Lands; but how much more I conceive very difficult to bring to an Average, as it depends greatly, on more or less Sun-shine, and brisk Winds.

The



Mr. *Badeslade* supposes also in the same (III.) Paragraph, that *one third of the Rain is retained in the Earth for the Uses of Vegetation*, which may be allowed him ; and whoever read Dr. *Hales's Vegetable Staticks* will easily perceive, that no less Quantity would be sufficient for that Purpose.

The next Supposition of Mr. *Badeslade*, in the same (III.) Paragraph, viz. *that one third Part of the Rain*, which, by a Consequence of the first Mistake, he computes at 13935,866,000 cubic Yards, supply the Springs and Rivers, cannot be granted, it being a great deal more than in truth is carried off the Fens to the Sea : For in the first Place, if it was full one third, instead of his Numbers, it should only be 1548,00,000 cubic Yards, but if the Reader will consult *Mariotte's Motion of Fluids*, or Dr. *Desaguliers's English Translation* of it (Page 22) he there will find, by a very fair Calculation, that in a Country extreamly well supplied with Springs, Brooks, and Rivers ; such is that Part of *France* above *Paris* : Supposing but 15 Inches perpendicular for the whole Rain falling during one Year, the whole Quantity of Water which is carried to Sea by the Rivers, is not so much as  $\frac{1}{6}$  of the Rain fallen ; and in the Supposition that the whole Quantity of Rain amounts to 18 Inches, the Quantity carried off by the Rivers to the Sea is not  $\frac{1}{6}$  of the Quantity of Rain : So that supposing (as is confirmed by Observation) that more Rain falls in more northern Latitudes, instead of one third of the Rain, as Mr. *Badeslade* supposes,  $\frac{1}{6}$  of the 18 Inches is the most that can be allowed for the Waters that are carried off by the Rivers from the Fens to the Sea ; that is to say, instead of what Mr. *Badeslade* has set down, it should only be 774,400,000 cubic Yards.

Mr.

Mr. *Badeflade* also asserts, in the same Paragraph, that the River *Ouse* is but 105 Feet wide at the Bridges, now I found the River *Ouse* at the four Bridges here under mentioned as follows:

Names of Places.	Breadth of the River. Feet.	Free Water Way. Feet.	Greatest Depth at Low Water. Feet.
<i>Downham's</i> ———	131	124	about 7.
<i>Stow's</i> ———	146	136	about 8.
<i>Magdalen's</i> ———	133	127	about 9.
<i>St. German's</i> ———	168	147	about 10.

But Mr. *Badeflade* calculating upon 120 Feet, which is not very different from what I found free Water-Way under *Downham*-Bridge, I shall follow him in his Calculation, allowing him for the present the rest of his Suppositions as to the Velocities and Depths of the *Ouse*, both in the Winter and Summer. Supposing it, as he says, *clear of Sands, and deep as ever known to be*; but the Numbers and Conclusions will be very different from his; for a River supposed, as he does, 120 Feet wide, 14 Feet deep, and running 200 Feet in a Minute will vent 12444 cubic Yards in one Minute, and allowing 60 Minutes to an Hour, 24 Hours to a Day, and 182  $\frac{1}{2}$  Days to the Winter Half-year; such a River running, as he supposes it, without Interruption will vent 3270,283,200 cubic Yards for the Winter Half-year; during which Mr. *Badeflade* makes it vent, I know not how, *Nine Millions* of cubic Yards; and for the Summer Half-year, supposing it with Mr. *Badeflade* but 9 Feet deep, it will vent only 2102,324,914 cubic Yards, instead of the *Six Millions*, and upwards, of Mr. *Badeflade*; that is, in the whole Year, supposing no Interruption from the Tides, it would vent only

5373,607,114



5372,607,114 cubic Yards, and not upwards of *Fifteen Thousand Millions*, as Mr. *Badeslade* has set down: Nay, supposing the Tides to interrupt it 3 Hours each Tide, or 6 Hours out of every 24, which is conformable to Observations, it will still vent the  $\frac{3}{4}$  of this, which is 4029,455,962 cubic Yards: So that, according to Mr. *Badeslade*'s own Supposition of the Rivers venting one third of the Rain, which is 1548,800,000 cubic Yards, the *Ouse* alone, due Allowance made for the Tides, without any Regard to the *Nean* at *Wisbeach*, or to *Shire Drain*, would vent much more than twice all that Quantity, and near three times as much; and if we make a truer Supposition, viz. that the Rivers at most do not discharge above  $\frac{1}{2}$  of the Rain, viz. 774,400,000, the River *Ouse* alone (due Allowance being made for the Interruption of the Tides) and without any Regard to the *Nean*, or to *Shire Drain*, would vent near six times as much as is required; and consequently supposing the River *Ouse* but half as deep, and the Velocity of the descending Waters but half as great as Mr. *Badeslade* has supposed, which is indeed very near the Truth in the present Condition of the River *Ouse*; still that River alone, if properly imbanked, to hinder its Overflowings after Floods, would be able to carry all that is to be carried from the Fens through the Out-fall of *Lynn*.

I proceed next to Mr. *Badeslade*'s (V.) Paragraph, wherein he asserts, *That  $\frac{2}{3}$  of the Rain falls in the Winter Half-year, when there is but little Heat to evaporate any Part of the Water: So that most of it runs into the Rivers, &c.* Here Mr. *Badeslade* is fallen into two vulgar Errors; one of which is, *that it rains more in the six Winter Months than in the six Summer Months*, which is very seldom true: For at an Average for a great Number of Years, it will appear, that it rains as much in any six Months, as in any other six Months;

H

and

and to shew my Reader how irregularly the Rain falls as to Quantity and Time, here follows the Quantity of Rain that has fallen during the Course of every Month in the Year 1743 and 1744: I am sorry I cannot oblige them with more at present.

	In. Dec.	In. Dec.
January	0, 915	0, 460
February	0, 645	0, 960
March	1, 490	1, 160
April	2, 120	3, 400
May	0, 420	0, 425
June	0, 450	1, 805
July	3, 220	0, 680
August	0, 980	2, 025
September	0, 050	3, 255
October	0, 745	5, 660
November	1, 140	2, 020
December	1, 350	0, 840
Totals	13, 525	22, 69

The other vulgar Error into which Mr. Badeslade is fallen, is that, but little Water is evaporated from the Earth or Water in Winter: Whereas Experiments prove the Reverse (see Dr. Hales's *Vegetable Staticks*, Vol. I. Page 55.) viz. I found the Evaporation of a Winter's Day to be nearly the same as in a Summer's Day; for the Earth being in Winter more saturated with Moisture, that Excess of Moisture answers to the Excess of Heat in Summer. But this is to be understood of the Evaporation which is made in the Shade, exclusive of what



what the Sun-shine exhales, or the Winds carry off; both which must certainly be greater in Summer than in Winter.

So that to correct the Reasoning, as well as the Numbers in Mr. *Badeflade's* (VI.) Paragraph, it must be laid down, that in the Winter Half-year there falls upon the 3000 square Miles, which supply the Fen Rivers, one half of the Rains that falls in a Year, *viz.* at 18 Inches for the whole, 2323,200,000 cubic Yards of Water; and supposing with Mr. *Badeflade*, that but one third of this should be wasted by the Earth and Exhalation in the Winter Half-year, which is certainly too little; and that the  $\frac{2}{3}$  remaining, *viz.* 1548,800,000 cubic Yards, which is certainly too much, were to be carried out to Sea by the *Ouse* alone, we have shewn above, that, according to Mr. *Badeflade's* own Suppositions, that River alone would vent 3270,283,200 cubic Yards in the Winter Half-year, 2102,324,914 cubic Yards in the Summer Half-year, and consequently 5372,608,114 cubic Yards in the whole Year; therefore all his Numbers in this Paragraph, and all the Conclusions he draws are false, especially this: *Consequently the Fens after a wet Winter must be drowned all the next Summer. &c.*

Mr. *Badeflade's* Numbers and Conclusions in his (VII.) Paragraph are no truer than the rest; for supposing with him, *the Rivers to run under Soil, in order to run off the Downfall Water through Sluices*, the *Ouse* alone being supposed with him 9 Feet deep, when the Water runs a Foot under Soil, it will vent in the whole Year 4204,649,828 cubic Yards of Water, which is almost double of the whole Quantity of Water that falls upon the *Fens* in a wet Winter; and consequently Mr. *Badeflade's* ultimate Conclusion, *viz. Therefore the Fens must be drowned, for want of the River Ouse being widened, &c.* is absolutely false; and the Remedy which

he proposed to this great imaginary Evil, *viz. to widen the River Ouse from Denvers to Seaward*, absolutely unnecessary.

I have been the more particular in examining Mr. *Badeslade's* Calculations, because he had brought so plausible Arguments, and made so much Shew of Numbers and Calculations, that till I had made the proper Measurements and Observations upon the very Places, and carefully examined his Numbers and Conclusions, I was intirely of his Opinion: However, I shall deal with him with the same Good-nature as with any of his Brother Projectors, and I am willing to believe he did not fall designedly into these gross Mistakes. I wish I could as well justify him in having suppress'd by an *&c.* (see his History of the Navigation, Page 93) the two last Paragraphs of an Affidavit which he had signed and sworn to, because *they made against him*; or reconcile this Behaviour of his, with the Behaviour becoming any Person who lays Claim to the Qualifications annexed to Mr. *Badeslade's* Name in the Affidavit inserted above, *viz. Those of a Gentleman, a Surveyor, and a Professor of the Mathematics.*

I beg my Reader's Pardon for so long a Digression, and now return to the present State of the Fens.

About the year 1740, Mr. *John Leaford*, a Person who had long been employed by the Corporation, especially in the making and repairing Banks in several Ports of the Fens, published several Observations on the frequent drowning of those Lands, and subjoined to it a Scheme, and an Estimate of the Expence of what he conceived would be an effectual Remedy. It is certain, that if nothing was to be regarded, but securing the South Level from extraordinary and outrageous  
Tides,



Tides, and the reverting of the Waters of the new *Bedford* River into it; Part of his Scheme might have been of Service in that Particular, without injuring the Navigation above *Denvers*; but since great regard must be had in any Scheme that is proposed to the Navigation below as well as above *Denvers*, to a sufficient Escape of the Land-Waters after great Rains, to the Out-fall of the Waters of the Middle Level, and to the general Out-fall at *Lynn*; I am of opinion that the Execution of Mr. *Leaford's* Scheme has been very wisely postponed.

This Scheme (for want of a better perhaps) was approved by many Persons, but highly disapproved (and indeed not without Reason) by others. However, though Mr. *Leaford's* Scheme was printed in the year 1740, the Corporation has not (so far as I am informed) taken to this day any Resolution as to its being put into Execution.

But the Fens being this Year more distress'd by the Waters than ordinary, and great Part of it being still under Water, it was lately thought high time to provide some Remedy: And his Grace the Duke of *Bedford*, &c. Governor of the Corporation of the great Level of the Fens, having done me the Honour to propose at the last general Court of that Corporation, that I should go down and take a view of the Fens, and of their Out-falls to the Sea, in order to give my Opinion as to what should appear to me the most likely Remedy; and Leave of Absence having been obtained for me from the Right Honourable, &c. the Commissioners appointed by Parliament for building *Westminster-Bridge*, &c. who have intrusted me with the Direction of the Works relating thereto, I set out from *London* on *June* the 27th last past for the Fens, and spent a Fortnight in viewing, measuring and sketching, setting down Observations, and taking the

the Informations of proper Persons upon the very Places; the Result of which, after very serious and mature Consideration, I have drawn up in what follows, hoping it may prove of Service towards the general Draining of so considerable a Part of His Majesty's Dominions. And in order to shew to my Readers that I am no ways bias'd or interested, I think proper to declare again what I did declare to the Gentlemen convened at *Salters-Load* on the 4th of July last, viz. *That I do in no wise attempt or intend to meddle with, or be concerned in any manner in the undertaking, or the directing, or the executing any Works to be performed in the Fens, whether contrived by me, or by any other Person or Persons whosoever.*

*To His Grace the Duke of Bedford, &c. Governor, and to the Honorable the Bailiffs, Conservators, and others of the Corporation of the Great Level of the Fens.*

*May it please your Grace, and the Gentlemen of the Corporation of the Fens.*

ACCORDING to your Desire, I have taken a view of the great Level of the Fens, and of their Out-falls to Sea. The Result of which View, and of the Observations I made, and of the Informations I received, I have reduced to the following Heads, viz.

I. I found the Fens, and especially the greatest Part of the Middle, and South Levels (which I had the Pleasure to see two Years ago in the most fruitful and beautiful Condition) deeply overflowed.

II.



II. I found the Banks in general (few excepted) in a very bad Condition, most of them full of Breaches, or considerably wounded, or lashed by the last Floods; and in many Places, especially on the South Side of the River *Ouse*, there is hardly so much as the Appearance of any Bank left for several Miles together.

III. I found that where the Banks are still able to keep more or less of the Waters of the Rivers and Drains, from the Surface of the Lands of the Fens, the Surface of the Waters in the Rivers is considerably higher than the Surface of the Land or Water in the Fens: I found in some Places three Feet four Inches difference; and in many Places the Bottom or Bed of the Rivers is as high, and even higher than the Surface of the adjacent Fens.

IV. I found the Nature of the Soil of the Fens, in general, to be a Moor, or a light, bituminous, and very porous Earth, mixed with rotten Grass, and other putrified Vegetables, quite unfit to make any durable Banks of itself, without being help'd with better Materials (none of which are near at hand) but must be fetched a considerable Way, and at a very great Expence.

V. I found that the River *Ouse* below *Denvers*, which is the only Out-fall to the Sea; for all the Waters that falls, or passes through a great Part of the Fens, is far from being so deep, and running with such a Current as one should naturally expect: On the contrary, I found in this River several Sands perpetually shifting, even higher than *Magdalen's* Bridge; which Sands increase more and more, as the River widens

widens below *St. Germans*, and all the way lower as far as three Miles below *Lynn* at least. These Sands are brought in by the Flood-Tides full six Miles above *Denvers*, and there left by those Tides (which run very foul in this River) for want of a sufficient Declivity in the Bed, and a sufficient Quantity of Back-waters ; which is evident, since every Land-Flood clears part of those Sands, and every Drought occasions their Increase, in Proportion as the Navigation is thereby distressed.

VI. I found the Waters throughout both the Middle, and South Level to have little or no Current towards their Out-fall ; the best I observed is in the new *Bedford River*, and the worst is in *Well-Creek*, which I found as it were stagnating.

VII. I found that in such Parts of the Fens where the Banks are tolerably good, the Owners have found themselves obliged to have recourse to artificial Draining ; that is to say, to throw the Waters over the Banks by the Help of Wind-mills ; and yet notwithstanding the great Expences attending this Method, it has not always the desired Success ; in some Places, on account of the Badness of the Banks ; and in others, because the Number of Mills is not proportioned to the Quantity of Lands which they are to drain, or to the Quantity of Water which they are to throw out.

VIII. Lastly, I was sorry to find all the Locks, Sluices, Draw-doors, and, indeed, all the artificial Works in the Middle and South Level (except at *Standground*) in a decaying Condition, and in want of great Repairs.

From



From these, and many other Observations, too tedious to mention in this Report, it plainly appears to me, and I deliver it as my humble Opinion, That the want of a sufficient Out-fall to the Sea, and the Admission of the latter Part of extraordinary high Tides, are the chief Causes, if not the only ones, to which must be attributed the deplorable Condition of the Fens, not only at this Time, but in every wet Season, till proper Means be employed to encrease the Out-fall of the *Ouse*, and to keep the Sea-Waters, as well as the Land-Waters, from the Lands.

When I say that the Out-fall of the *Ouse* to Seawards is not sufficient, I mean only as to Current and Declivity; and as to Depth, for as to Breadth, I have proved, that the Breadth of the Free-water-way under either *Downham-Bridge* or *Stow-Bridge*, through which the whole Quantity of Waters is discharged, is more than sufficient to carry it off: If by that Time the Waters of the River *Ouse* are come to those Bridges, they were of such Depth, and had such a Velocity as is usual for such large Rivers to have so near the Sea.

I think what I have said hitherto sufficient to explain what, in my humble Opinion, is the present Case of the Middle and South Level of the Fens, and what must carefully be attended to by any Person who shall ever attempt to offer any Method towards a total, or a partial Cure of an Evil so great, and so justly complained of.

The next Thing desired of me, is to give my Opinion of Mr. *Leaford's* Scheme, and my Reasons for it. ———  
The Substance of this Scheme, as it was delivered to me in Print, is as follows:

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The

*The Substance of Mr. JOHN LEAFORD'S Scheme.*

“ It is proposed to open the two Arches, called *Colonel  
“ Ruffel's two Eyes*, and fix therein proper Sluice-Doors to  
“ prevent the Tides putting up into the *South Level*, and fit  
“ to navigate through at the Reflux, when the Waters of  
“ the Hundred Foot do not over-ride those of the *Ouse*.—To  
“ dam up that Part of the Course of the *Old Ouse* a-cross  
“ from the said two Arches, or Eyes to the next Shore.—  
“ To scour out *St. John's Eau*, and lay the Earth on the  
“ *Norfolk Side*, and open the upper End of that *Eau* to the  
“ *Ouse*.

“ To place Pen-sluices in the upper End of the said *Eau*  
“ fit to navigate through out of the *Ouse* into the said *Eau*  
“ at such times as there shall be an Obstruction at the Sluices.

“ To take off the Heads of the Arches of the Bridge  
“ over the *Eau*, and make it a Wood Bridge high enough  
“ to navigate under.—To place a Pair of Ebb Doors at the  
“ Mouth of *Roxham-Drain*, which empties itself into the  
“ said *Eau*, to prevent the Waters reverting up that Drain.

“ Total of Mr. *Leaford's* Estimate — £. 4000 : 0 : 0

“ N. B. That when the Tides, and hundred Feet Waters  
“ shall over-ride those of the *South Level*, and keep the  
“ Doors shut in the two Eyes at *Denver Dam*, the Water  
“ above that Dam will rise and put down *St. John's Eau* ;  
“ and by their Weight, when they have filled the *Eau*, will  
“ force open the Sea-Doors at the Mouth thereof at all times,  
“ save



“ save for a small Space of Time, whilst it is high Tide in  
 “ the River ; but immediately upon the Reflux the Sea-  
 “ Doors will open, and by that means there will be no occa-  
 “ sion for a Pen-fluice at the lower End of the *Eau*”.

After having carefully examined this Scheme, and compared it with my Observations upon the Spot, I deliver this as my humble Opinion :

I. That if the Scheme is put in Execution, it will prove of great Service to a very considerable Part of the South Level, by keeping the Sea out ; but those very Lands will then be more liable to be overflowed by the Land-Floods than they are now.

II. That it will be of no Detriment to the Navigation above the proposed Dam.

III. That it will prove of very great Detriment to the Navigation below, between the proposed Dam, and *St. Germans*.

IV. That it may prove of some Detriment to the Navigation below *St. Germans*.

V. That it may in Time, but not immediately, be of Detriment to that Part of the Middle Level, which has its Out-fall in the River *Ouse*.

As to the Reasons for my being of the Opinion delivered above, in relation to Mr. *Leaford's* Scheme, I believe that whoever has read and considered what I have said hitherto,

will not be at a Loss to find them: However, to comply with the Desire of the Gentlemen who met at *Salter's Load*, here follows some Reasons which I think sufficient:

I. I am of Opinion, *That if this Scheme is put in Execution it will prove of great Service to a very considerable Part of the South Level, by keeping the Sea out*; because I have seen with my own Eyes, in *July* last, that the Rivers run above Soil almost every where; that the Banks are in a very bad Condition, and that till they are mended, every extraordinary Tide must necessarily overflow those Parts of the Fens, which I own such a close Dam, and Sluice-Doors as *Mr. Leaford* proposes would prevent; but since such Works would also hinder the Tides from putting up at all into the South Level, I shall never advise any such Thing; and I say further, *That those very Lands will then be more liable to be overflowed by the Land-Floods than they are now*; because though I am certain that the Land-Waters in Summer, and dry Weather are so inconsiderable, that either of those Passages called *Russel's Eyes* would be sufficient to carry them off, one being 17 Feet and a half, and the other 16 Feet wide; yet in Winter and wet Weather, I am clearly of Opinion that either, or both those *Eyes* or Passages, nor even the present Passage of 80 Feet wide, is alone sufficient to carry off the Land-Floods without *wire-drawing* them, and consequently oblige those Waters to rise higher than needs be, against their Banks and Forelands; and the River *Ouse* being about 100 Feet wide above *Denvers*, and having 124 Feet Free-water-way at *Dounham-Bridge*, I think it was extremely wrong to restrain the Passage to 80 as was done at first; still worse to reduce this to 54 Feet, as was the old *Denvers-Sluice*, and still more absurd to propose to dam up this



this very narrow Passage for the Land-Floods, and substitute a much less to it.

II. I am of Opinion, *That this Scheme would have proved of no Detriment to the Navigation above the proposed Dam*; because it was proposed to have a Lock, or Pen-Sluice (as they call it in the Fens) which would have always preserved a Communication from the River below *Denvers* to the River above it; and that as to the inland Navigation, such a Lock (if well made) would prove rather of Service than Dis-service to it; because I have seen a prodigious inland Navigation continually carried on through *Holland, Flanders*, and all the adjacent Countries; all which is performed by the Help of Locks.

III. I am of Opinion, *That this Scheme would have proved of very great Detriment to the Navigation below between the proposed Dam and St. Germans*; because from what has been related, and indeed from the Dictates of common Sense, the silting up of the River below *Denvers*, 8 or 10 Feet above what it was before the Dam was built in 1650, was occasioned by that Dam hindering the Tides from flowing up at all above *Denvers*; and that I am very sure that the like Causes will always produce the like Effects.

IV. I am also of Opinion, *That this Scheme might also prove of some Detriment to the Navigation below St. Germans*, for the same Reasons as I have just now mentioned; but I say only, that it might prove of *some Detriment to the Navigation below St. Germans*; because the Navigation below *St. Germans* does not intirely depend upon the Land-Waters, but also on the Alterations which the Tides and Winds occasion

sion among the Sands, which are filted up by the Sea, and must remain so, more or less, according as there are more or less of Land-Floods, joined with the Return of the ebbing Tides.

V. Lastly, I am of Opinion, *That this Scheme might in time, but not immediately, be of Detriment to that Part of the Middle Level, which has its Out-fall in the River Ouse;* because I am certain, that if the River is dam'd up at *Denvers*, or any where else, and the Tides hindered from putting up above: Such an Obstruction must occasion a further Increase of the filting up of the Sands below that Obstruction, and in time might choak up the Mouth of all the Out-falls of the Middle Level into the *Ouse*; the Consequence of which I need not enlarge on.

Mr. *Leaford's* Scheme is so contrived, that if ever it was put in Practice, there is a Necessity of cleaning, and in a manner new digging, an old Cut or Slaker some Miles in Length, called *St. John's Eau*, long since disused, and now in a great Measure filted up; and at the upper End of this old Cut new cleaned, Mr. *Leaford* proposes a Lock or Pen-fluice, for the Sake of Navigation, which is the only thing in his Scheme (and I am sorry to find it so) against which I have no Objection: But the clearing of this *St. John's Eau* must occasion the further Expences, as Mr. *Leaford* proposes, *of taking off the Heads of the Arches of the Bridge over the Eau, and make it a Wood Bridge high enough to navigate under:* And also the further Expence, as Mr. *Leaford* proposes, *to place a Pair of Ebb-Doors at the Mouth of Roxham Drain, which implies itself into the said Eau to prevent the Waters reverting up that Drain.*

Now



Now my humble Opinion is, that the clearing of *St. John's Eau*, and all the other incidental Expences, just mentioned, would be just so much Money thrown away, because it appears very clearly to me from the Dictates of Reason, supported by Experience, that all Slakers, or Side-discharges (and *St. John's Eau* is nothing else) should never be used but in Cases of the utmost Necessity, or else they do, in time, ruin the very main Rivers they were intended to help ; for certainly no Proposition ever appeared to me more evident than this, that the more Waters pass through an Out-fall, and the better that Out-fall will be.

It might, perhaps, be expected from me, that I should also give my Opinion as to the Estimate annexed to Mr. *Leaford's* Scheme ; but the Dimensions, and the Nature of the Works being not sufficiently detailed, and being not fully acquainted with the Prices of Materials, Workmanship and Labour, usually paid in the Fens ; I hope to be excused from that Task.

As to the *N. B.* annexed to that Estimate, I know that what is asserted there, is impossible, and that as long as the *New Bedford River*, or the Tides, or both together, should be able to keep the Sluices which Mr. *Leaford* proposed to erect at *Denvers* shut, the Sea-Doors at the Mouth of *St. John's Eau* must also necessarily be shut.

I shall now propose the best Remedy I have been able to find for the Relief of the Fens: I order to which, as it often happens, *that those who undertake too much, succeed in nothing.* I applied my Thoughts towards finding what would relieve the Lands in the Middle and South Levels of the Fens, and improve their Out-falls to the Sea by the Part of *Lynn* : And postponed, considering of a Relief for the North Level, and the Improvement of the other Out-fall of the Fens by *Wif-beach*

*beach* to another Opportunity. The next Step I made was to set down the several Points or Things which I was to attend to, and provide for, in framing a Method for the Relief of the Middle and South Level of the Fens, and their Out-falls, which, after serious Considerations, I reduced to the six following Heads.

I. It appears to me, that the River *Ouse* having 124 Feet free Water-way under *Downham Bridge*, and 95 Feet a very little way above the Remains of *Denver's Sluices*; its Free-water-way being contracted by those Remains to 79 or 80 Feet at most, must be a great Hindrance to the free Descent of the Land-Waters after great Rains, and consequently must hinder, in some measure, the good Effect of those Floods in grinding and carrying away the Lands silted in the River; and must also pen up the Waters in the *Fens* longer than otherwise they would, if the Passage was wider: So that instead of contracting the River *Ouse* at *Denver's* still more, I thought it absolutely necessary that it should be widened considerably, more especially when I considered, that, according to my Informations, the Old *Ouse*, after great Rains, will rise by the Land-Waters 2 or 3 Feet perpendicular above its Forelands: And in order to proportion the Breadth of the *Ouse* at that Place to what it is above and below, it appears to me the Free-water-way ought to be enlarged, where *Denver's Sluice* stood to about 100 Feet wide: How I propose to do this shall be explained hereafter.

II. As it is evident, that the Waters in the *Fens*, which are not evaporated by the Action of the Sun and Winds, want a better Out-fall to Sea than they have now, by reason of the Bed of the River having been silted up about 10 Feet above what



what it was in 1650. I endeavoured to find what would deepen the River *Ouse* towards the Sea, and consequently give a greater Current to its Waters; but I was sensible, that this could not be done at once, and that the Evil being a Work of Time, no Remedy could be made to act instantly: Moreover, as I found 2 Feet of Sand filted up above the solid Dam at *Denvers*, I am very certain that no Method, or Contrivance, except Men's Labour, or Engines, could deepen the River above *Denvers* lower than the natural Slope, or hanging Level, which the River had when it was only filted up to the Top of that solid Dam; that is to say, I am of Opinion that the *Ouse* may be deepened above *Denvers* about 2 Feet, but no more, as long as that Dam subsists; and I have no Reason to believe, that as long as that Dam subsists, the Tides, or the Land-Floods, or both, or any Contrivance can ever deepen the River *Ouse* below *Denvers* much more than those 2 Feet: However, I am of Opinion, that if by the Method which I am going to propose, the River below *Denvers* was deepened but 2 Feet all the way to Sea, this would not only clear the Out-falls of the Middle Level into the *Ouse*, so as to give great and frequent Opportunities to the Rivers and Drains in that Level to discharge their Waters in the *Ouse*; but that last-mentioned River having thereby an Increase of Back-Water, and 2 Feet more Fall, would have a much better Current, and consequently greatly relieve the South Level, and also greatly improve the Out-fall, and the Navigation of the Port of *Lynn*; and being further of Opinion, that if the Method I shall propose be duly put in Execution, it may (and I verily believe it will) deepen the River below *Denvers* 2 Feet in a Year's Time, especially if that Year should prove a wet one; and being certain, that if this happens, there will be no great Difficulty in improving

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that Method so as to be able, in a few Years, to restore the River *Ouse*, and its Out-fall at *Lynn*, to their former Depth, I bent all my Thoughts to the finding a practicable Way to perform this Operation of deepening the *Ouse without Men's Labour, or the Use of Engines*; and I soon found, that, instead of shutting the Tides out, by letting them in and out at proper Times jointly with the Land-Waters, by increasing their Velocity, and by giving them a proper Direction, I had (if not a Certainty) at least a very great Probability of succeeding, as I shall further explain hereafter.

III. I considered, that whatever Method was made use of, some effectual Remedy must be found to hinder the reverting of the Land-Waters coming down the New *Bedford River*, after great Rains into the South Level, without contracting or hindering a free and ample Passage to the Waters of the Old *Ouse*, whenever they are not over-riden by the Tides, or by the New *Bedford River*, in which I found no Difficulty, as I shall presently shew.

IV. I found by my Observations, and the Informations I received, that none of the neap Tides ever reach *Denvers*, or the New *Bedford River*; that, at a common Tide, the Rise of it is not above a Foot or two at *Denvers* or *Salter's Load*; and that a common Spring Tide does not rise above 3 Feet at the last-mentioned Places, but that it rises much higher in extraordinary Tides, especially if attended with fresh Winds from the N.W. to the E. N. E. from whence it plainly appears to me, that the free Admission of common Tides can do no Damage to the South Level; but that the latter Part of the Rise or Flood of those extraordinary Tides overflows the South Level, and always will, till the Rivers in it are much



much better imbanked, or till some proper Means be used to restrain only that Part of those extraordinary high Tides which does Mischief, without restraining the far greatest Part of the Tides, which does no harm to the South Level, and are most powerful Agents to keep the Port of *Lynn* (or in other Words the Out-fall of the *Ouse*) open: How I propose to do this shall be presently shewn.

V. The next Thing which appeared to me ought to be attended to, in any Method that should be proposed, is that the Navigation from *Lynn* upwards into the Land ought to be preserved without any Interruption, as well in the Time that the *Ouse* is over-ridden by the Tides, or by the New *Bedford River*, as when all the Waters have their Course towards the Sea, in which I found no Difficulty.

VI. The last Thing considered is OEconomy, well knowing the cheapest and simplest Methods are always the most acceptable, and indeed the most preferable, except where Taste and Magnificence are required; and therefore I have taken some Pains in reducing as much as possible the Expence attending the Remedy or Method which I am going to offer.

How I have succeeded as to Contrivance or Judgment, and how likely it is, that these Proposals (if put in Execution) should answer the Ends proposed in the Articles just now mentioned, let the impartial Readers judge.

## PROPOSALS.

I. It is proposed, that *Colonel Russel's two Eyes or Openings* be cleared as low as the Top of the solid Dam now lying

about 2 Feet under the Bottom of the *Ouse* in the Remains of *Denvers Sluice*, and the River so far cleared above and below as to afford a free Passage to the Land-waters, and the Tides.

II. That a Lock, or Pen-sluice be constructed on the East Side of the Eastermost of the *two Eyes* of about 50 Feet clear in the Length, between the two Pairs of Breast-gates, which are to point down the River, and about 13 Feet clear in Width.

III. That in the Opening of the Remains of *Denvers Sluice*, and in the two other Openings, or *Eyes*, there be placed 28 Draw-doors, from 3 Feet to 3 Feet six Inches wide each, made so as to shut close upon the Top of the solid Dam, and properly supported, leaving a free Passage for the Tides of 87 Feet in the Clear, besides the 13 Feet in the Lock, which is 100 Feet Passage for the Land-waters, as is express in the Drawings, which I have delivered to the Corporation of the Fens.

The Uses of these Works, and the Advantages that are to be expected from the Execution of these Proposals are as follows:

All the Draw-doors are to be always left open for the free Admission of all common Tides, except at such Times only as the Waters coming down the *New Bedford River*, override those of the *Old Ouse*, and during the last Quarter of the Flood, when the Tides rise to such an extraordinary Height as would overflow the Banks or Fore-lands in the South Level.



As soon as the Danger of the Waters in the *Bedford River*, over-riding the River *Ouse*, is over, or as soon as the extraordinary Tides have ebb'd so as to be no higher below the Draw-doors than the Waters are then in the *Ouse* above them.

All those Draw-doors are to be opened in order to let the Waters in the Old *Ouse*, and the Rivers which fall into it, together with those of the New *Bedford River*, and the other Drains of the Middle Level, and what the Tides had brought up in the Lands act jointly all together in carrying off the Waters from both those Levels, and scouring the River below *Denvers* and *Salter's Load*: In order to which, careful Persons must reside constantly upon the Place, in order to watch the New *Bedford River* whenever it is expected its Waters are likely to over-ride and revert up into the Old *Ouse*, instead of taking their Course down towards the Sea; and also to watch the Tides whenever any extraordinary Spring Tides are expected, the latter part of which only can do any Mischief to the South Level, and no more of the Tides should ever be hindered flowing into it. All which can very easily be managed without any Danger or Mistake, by making a few Observations on a high Spring Tide, and making proper Marks upon one of the standing Posts of the Draw-doors, which should never be shut but in such Cases of Necessity as I have just now mentioned, and must all be drawn up as soon the Danger is over.

Moreover it will be very easy to increase the Velocity of the Waters down the *Ouse*, by shutting a Pair of Land Gates just above the Lock, and suffering the Waters below the Draw-doors (when they are down) to fall about 6 Inches lower than those above; but I would not advise to stay any longer, on pretence of increasing the Velocity of the Waters  
below

below still more; because the Consequence will be only this: that the Waters will gull a Hole just below the Draw-Doors, and throw up a Bar of Sand a little lower.

The Advantages that will result from the Execution of these Proposals, and a careful Management of its several Parts are as follows:

I. The South Level will be secured from being overflow'd by the latter part of the Flood of any extraordinary Spring Tide, or by the reverting of the Waters of the new *Bedford* River.

II. The Waters coming down from the Lands in and about the South Level will have a much greater Passage for their free Descent than they have had for many Years; since, instead of the present Passage at *Denvers*, which is barely 80 Feet wide, and silted up two Feet above the solid Dam, there will a free Water-way 100 Feet wide, and as deep every where as the Surface of that solid Dam; that is to say, two Feet deeper than it is at present.

III. The Tides will have their free and usual Flow through a clear Water-way of 87 Feet, which is 7 Feet more than at present, and 2 Feet deeper, except only that Part of the latter end of the Flood of very extraordinary ones, which at present overflow the Lands in the South Level, and there remains for the most part stagnated till the Waters be evaporated by the Sun and Winds.

IV. The Middle Level can no ways be injured by the Execution of these Proposals, since the Tides will not rise a Hair's Breadth higher in the new *Bedford* River more than they



they do now; because Tides always rise exactly, and never more than in proportion to the Impulse which they receive from the Sea. On the contrary, both the Middle and the South Level have (if not a Certainty) a great Probability that the Land-Waters, and the Tides being made to act jointly, at all proper times, they will scour and deepen the River *Ouse* much better than they do now; and consequently that the Current of the *Ouse* will be increased in proportion, as a greater Fall will be obtained by its being deepen'd.

V. The Outfall to the Sea, or the Port and Navigation of *Lynn*, must also be improved by the Execution of these Proposals, since not only the Waters that used to revert from the *Bedford River* into the South Level, from whence little or none returns (as Mr. *Badeslade* and others have declared in the Affidavit mentioned before) will be conducted through their natural Outfall to Sea, but all the Land-Waters in the old *Ouse*, and the Rivers which fall into it, together with what the Tides bring above *Denvers*, will thereby be made to act jointly with those of the *Bedford River* and the other Drains of the Middle Level towards deepening the River, and clearing it from the Silt brought in by the Sea, much more forcibly than they do at present.

VI. The Navigation from *Lynn* up into the Country by the old *Ouse* will in no wise be hindered or interrupted by the Execution of these Proposals; because a proper Lock or Pen-Sluice is therein provided, through which the Vessels may always pass, and through which they will be able to pass almost at all times without shutting the Gates or penning any Water; since those Gates are always to be kept open, except when the new *Bedford River* would (if not prevented) override

ride the old *Ouse*, and for about an Hour or two at most, about the time of the High-water of extraordinary Tides, at which times the Draw-Doors being down, the Breast-Gates of the Lock will also shut themselves, and they will open themselves as soon as the Waters in the *Ouse* can descend towards the Sea.

As I know of no reasonable or material Objection that can be made against the Execution of these Proposals, I shall hasten towards a Conclusion, after observing that their being put into Execution will require much less time, and be attended with a much less Expence than Mr. *Leaford's* Scheme.

That it will afford the quickest Relief, I can think of, to the South Level, without injuring the Middle Level, or the Port of *Lynn*, and the inland Navigation; on the contrary, I am clearly of Opinion that it will be attended with all the Advantages just now mentioned, and perhaps with others which don't offer themselves to my Mind at present.

That in case the Method proposed be attended with so much Success as to deepen the River *Ouse*, though it were but one Foot or two from *Denvers* to *St. Germans* (of which I have great Hopes) Nature itself points out what is next to be done, in order to restore to the *Ouse* and Port of *Lynn* their former Depth, and to perfect the great Work of draining the Fens.

That in case, contrary to my Hopes (and all good Men's Hopes) this Method should not be attended with all the Advantages



vantages which may reasonably be expected from it, all the Works mentioned in the Proposals may be taken up, and the River Ouse restored to its present State in a very few Days time.

Lastly, I hope that in case the Honorable Corporation do put these Proposals in Execution, and find themselves as much relieved thereby as I wish and hope they will, I humbly recommend to their next future Consideration the making or repairing the Banks along the Rivers of the South Level in particular, which though it is a Work that requires Time, and a very considerable Expence, it is, after all, the safest and most natural Way of preserving the Lands in the Fens from being overflowed by the extraordinary Tides, and the Land-Waters; for in the Method now offered, or in any other Method, besides that of embanking, there can be no other Provision made against the Land-Floods, than by giving them a larger and deeper Out-let to Seawards; and in my humble Opinion to pretend that Lands situated as low as the Fens are, particularly in the South Level, should not be overflowed by the Land-Waters, or by extraordinary high Tides, without embanking the Rivers, is to pretend, that Nature should act differently in the Fens from what it does every where else.

*Rusticus expectat dum defluat amnis, at ille  
Labitur, & labetur in omne, volubilis, ævum.*

I have nothing more to add, than to desire that my honest Endeavours, and disinterested Views may be taken in good Part; and to submit the Whole of what I have said, or offered

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to the serious Consideration and Judgment of the Honorable Corporation. I remain, with all due Respect,

*Your Grace's,*

*And the Gentlemen of the Corporation's*

*Most obedient, and*

*Most humble Servant,*

CHARLES LABELYE.

Crown-Court, Westminster,  
August 8, 1745.

F I N I S.

